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AMERICAN SOCIETY OF CIVIL ENGINEERS

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PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS OF THE SOCIETY

December 17th, 1919.—The meeting was called to order at 8.30 P. M.; Vice-President Herbert S. Crocker in the chair; Chas. Warren Hunt, Secretary; and present, also, 235 members and guests, including a number of ladies.

Vice-President Crocker introduced the speaker of the evening, William V. Alford, Assoc. M. Am. Soc. C. E., who delivered an interesting address on "An Engineer's Rambles in Central and South America", illustrating his remarks with numerous lantern slides.

The Secretary announced the following deaths:

STEPHEN PEARSON BROWN, of New York City, elected Associate Member, October 5th, 1904; Member, November 1st, 1910; died December 6th, 1919.

PAUL SOURIN KING, of Wilmington, Del., elected Member, July 3d, 1889; died October 30th, 1919.

WILLIAM NEWBROUGH, of Kemmerer, Wyo., elected Member, April 6th, 1904; died November 1st, 1919.

MASON ROMEYN STRONG, elected Member, March 6th, 1901; died December 2d, 1919.

Adjourned.

January 7th, 1919.—The meeting was called to order at 8.30 P. M.; Vice-President Nelson P. Lewis in the chair; Chas. Warren Hunt, Secretary; and present, also, 140 members and guests.

An illustrated lecture by John P. Hogan, M. Am. Soc. C. E., formerly Lt.-Col., General Staff, A. E. F., and Chief of Topographical Service, Second U. S. Army, was presented, on the subject of "Military Maps, with Special Reference to the Application of Aerial Photography to Map Making". The subject was also discussed by Messrs. F. A. Snyder and Allen Hazen.

The Secretary announced the following deaths:

HENRY WILSON HODGE, of New York City, elected Junior, January 5th, 1887; Member, October 2d, 1895; died December 21st, 1919.

JOHN PATRICK O'DONNELL, of London, England, elected Member, July 5th, 1893; died December 2d, 1919.

ROBERT VAN BUREN, of Norwalk, Conn., elected Member, June 17th, 1868; died December 16th, 1919.

Adjourned.

FAMILY RELATIONS

ADDRESS BY WILLIAM G. RAYMOND, M. AM. SOC. C. E., AT THE FIRST ANNUAL MEETING OF THE IOWA ASSOCIATION OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS, NOVEMBER 20TH, 1919.

It is not clear that the American Society of Civil Engineers and its Local Associations bear the relation of parent and children.

Children look to their parents for guidance and assistance in their affairs until they are able to go alone, and then—well then they usually go alone. Nothing of that sort is contemplated in the creation of local associations of the American Society of Civil Engineers.

Parents usually are anxious to see to it that their children are prepared to go alone, to break away from the family circle and establish new circles of importance and magnitude equal to that of the parent circle. Surely the American Society of Civil Engineers has no wish to train these local associations with a view to having them break away from the central Society, to form wholly independent organizations of importance and magnitude comparable to that of the Society. Indeed, that would be impossible. No such organization could grow into such importance and still be a part of the Society, the part cannot be greater than the whole.

Again, new families are still parts of old families from which they spring until the old families are gone. No one looks for the American Society of Civil Engineers to die.

And so, look for an analogy as one may, it is difficult to see that the relation of child and parent exists between this organization and the great Society of which it is a part.

Therefore, it would seem to be improper to speak of this Iowa Association of Members of the American Society of Civil Engineers and the Parent Society.

This is the day of organization, every one is organizing himself into a society and publishing a magazine. It is not clear that this is a good thing, and so it may be uncertain whether your speaker has to his credit or his debit the making of the motion that created the committee that created this organization.

If the organization proceeds to publish a magazine your speaker will feel pretty sure that a debit should be charged against him. On the other hand, if the Association simply uses its best endeavor to help the greater Society that has made the smaller one possible—and in so doing makes the greater Society of more value to the members of this State—your speaker will feel pretty sure that a credit mark is due. Your speaker did not choose his subject, but did select the title of the

paper, namely, "Family Relations," but upon considering the matter he is fairly well convinced that the title is improper, that there is no such thing as family relationship between this Association and the American Society of Civil Engineers.

The reason for establishing such a local organization as this is found in the hope that by such local organization the Iowa members of the American Society of Civil Engineers will get more out of their membership and by the development of greater interest will contribute more to the progress, influence, and good work of the greater Society than they would or could as individuals.

It is thought that the relationship of the Iowa Association to the Society is not different from the relationship of each individual member to the Society, but the voice of the Association is bigger than the voice of a member, and if the membership is united, harmony is developed out of discord by the tuning of many voices in unison. These voices cannot be tuned together unless they get together in one place.

Except for the stamp of professional competency that goes with the badge, the non-resident member of the Society who does not meet with his fellows more or less frequently, might better subscribe to several technical journals at $5.00 a year each, than to pay $15.00 a year for a dozen issues of the Society's *Proceedings*. The stamp is what is paid for and is worth what it costs if the members make it so.

Now the relationship of this Association to the greater Society—of which the Association is a part—being, as has been said, not different from that of a single member to the greater Society, it remains only to be discovered what the member's relationship is, and do you know, that after thinking over this question for many days, the answer does not come in any elaborate form or apart from a statement of the duties of members to the Society, and the Society to members, and these duties in detail are the subject of another discussion.

Perhaps a general statement may be made without encroaching on another's field.

The duty of a member is to keep himself in all his professional and personal life above reproach, to advance himself as much as possible by study and observation and performance not only as a duty to society, but as a duty to the organization which has given him its stamp of approval as a professional man. The performance of this duty by many members is what makes the stamp of approval worth having. Therefore, if a selfish motive is needed, it is found in the fact that in the performance of duty the member is contributing in a double way to his own advancement.

It is the duty of the Society as a whole to do those things that are necessary to the advancement of the Profession, not simply to make

its members better money getters, but to lift the ideals and professional standards to the highest plane that can be reached. If engineers as a body respect themselves, they will be respected by others. It is the duty of the Society as a whole so to order the practice of the Profession that none but self-respecting men of education and capacity, with hands to do, and minds to reason, and hearts to feel, will be eligible to membership.

It must be remembered always that the great duty of the Profession is to society, and in so far as the individual members forget self and strive for the accomplishment of that which is for the good of their fellows, in so far will the individual realize what should be his ambition. And in so far as the Profession as a whole concerns itself with correct and rational solutions of the great industrial and sanitary problems of society, in so far will it accomplish what should be its mission—the development of a higher and better order of living for mankind.

This Association is part of the greater Society, it is not a child of the Society. It should stand in the relation of adviser for this district to the Society and in the relation of servant too, just as an individual member should stand in the relation of adviser and servant. The difference is only that the Association is more powerful than the member.

The Association by discussion by members may arrive at a clearer notion of proper procedure in a given case than a single member groping by himself may be able to form.

It seems to be very difficult to enlarge more on the relationship of the Association and the Society without encroaching on the subject assigned to another, but perhaps it will be proper to call attention to the belief, which may be disputed, that this Association meeting here should be just as much a meeting of the American Society of Civil Engineers as the little group meeting held every other week in the Society's rooms in New York. True, the officers are not here, but the purpose is here—the function is here, the people are here—and here is a meeting of the Society to which any member is welcome and in the deliberations of which any member may share. The Society is everywhere where a few of its members are gathered together, it is not in New York alone. And this leads to the thought that it may be well to discuss certain evidences of relationship that have been suggested as properly to be created.

The Seattle Association has proposed the creation of certain evidences of relationship, not only to establish the relation more completely, but for the purpose of showing to the world the real National character of the Society, and increasing its influence for good in the solution of questions of National importance with which the Engineering Profession is concerned.

Five proposals were made as follows, amended by substituting the word "association" for the word "section":

First.—That the Annual Meeting be composed of duly elected delegates from the Local Associations.

Second.—That all applications for membership be considered by the Local Association having jurisdiction before being acted on by the Board of Direction.

Third.—That professional papers be first presented to a local association, except those that may be selected for annual meetings or conventions.

Fourth.—That a sufficient proportion of the annual dues be remitted to the Associations to care for the necessary expenses.

Fifth.—That the work of the Headquarters' Office be confined to general administration, issuing the publications, and arranging for annual meetings and conventions.

It is believed that this Association can discuss these proposals with much profit and after due discussion can make a deliverance of the best judgment of the members as to the advisability of pressing these proposals for consideration by the whole Society.

Discussion should proceed, not with any idea of magnifying the importance of this or any local association, but solely with the thought of developing to its utmost the importance and influence of the American Society of Civil Engineers, not simply for the purpose of increasing its power, but for the purpose of making it known as a great organization of high ideals of professional skill and personal and professional honor, and having for its object the advancement of civilization by service to society.

DISCUSSION ON THE REPORT OF THE COMMITTEE ON DEVELOPMENT*

By Messrs. William Hammond Hall, J. P. Hallihan, and J. L. Van Ornum.

William Hammond Hall,† M. Am. Soc. C. E. (by letter)‡—The Committee on Development of the Society by its report of October 14th, 1919, its previous report, and by bringing out the discussion which has appeared in the *Proceedings*, has done a work which should effect much betterment in and for the profession and the Society. But it seems to the writer that the groundwork on which the good of American civil engineers, and hence of their Society, must rest, has not been completely covered even by this excellent committee work and discussion of it; and the writer seeks to draw attention rather to points a little aside from those thus far touched upon.

There is so much good in the Committee's work which will be generally acclaimed, that remarks which might be construed as criticism on some points, can not diminish its value. It is not, on the whole, clear whether the major object of the present movement is the good of the Society, and, incidentally, the betterment of conditions among civil engineers, or the good of American civil engineers, and, incidentally, the betterment of their Society. Very naturally, the good of the Society takes precedence in the Committee's vision; while the betterment of conditions among civil engineers seems to loom largest in the minds of those who have discussed the Committee's work.

Putting the case a little differently: It seems to the writer that, while the Society may attempt much to better the condition of the Profession, it can only succeed in that direction by what civil engineers as men themselves effect before the public. A society of men can not rank with the public much above the individuals who compose it, and a multitude of men who are as a rule individually inert towards an objective, can not expect to be potential in that direction as a body. Special technical accomplishment will of course help the individual, especially when the public sees that as a man he is worthy, but a vast body of men in whom as individuals the public may not, preponderatingly, recognize special merit, can not be helped materially by their representative Society, even though the Society knows them to be each as worthy, technically, as he who has attained to public recognition.

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* Continued from October-November-December, 1919, *Proceedings*, p. 920 of Society Affairs.

† San Francisco, Cal.

‡ Received by the Secretary, December 22d, 1919.

Under the heading, "Technical Activities" in the Development Committee's last report, we find the following:

"The Committee believes that the standing of a great engineering society depends mainly on the activity and progress of its technical work, and is of the opinion that more active co-operation in movements for public and professional welfare, as hereinafter proposed, should not be allowed to diminish the importance attached to the technical activities of the American Society of Civil Engineers, but rather that these should be stimulated in the interest of science and the profession."

And then follow suggestions and recommendations, which are excellent. But it seems to the writer that there has been an omission. The reason why "the standing of a great engineering society depends mainly on the activity and progress of its technical work" is because the body of men composing it have not in the past established a firmer and broader footing for it, by placing themselves as citizens further forward, higher up and closer together. Perhaps this has been impossible, but the fact remains that had it been done, the reliance now would not be mainly on the activity and progress of its technical work. And so, it seems to the writer that the report might, to the advantage of the profession, have contained a paragraph substantially like this:

"The Committee believes that the standing of the great Civil Engneering Profession depends more directly on the dignity and forcefulness with which its members conduct themselves as cultivated men and citizens, before the public, and is of the opinion that if, through the more active co-operation in movements for public and professional welfare, as hereinafter proposed, civil engineers succeeded, by exercise of the above qualities and course, as lawyers, doctors, and ministers succeed in this regard, the American Society of Civil Engineers would soon be above dependence on mere technical activities for high public standing."

We do not find such a paragraph in the Committee's report; and yet, does it not state the truth?

Surely, the standing of the great engineering profession before the public—and that is where it lacks standing, and where its members cry out for higher standing—depends on the dignity and forcefulness of its members, individually and as a body, before the public, just exactly as the standing of either of the other professions depends on the like personal and collective deportment, as men, of those who practice such professions.

The public standing and civic influence of the lawyer, as a rule, does not depend on the soundness in law of his briefs or the ability of his arguments at the Bar, much less on his deep erudition in the technicalities of his profession or on his abilities as known to the Bar Association. Attorneys who are most in the public eye, who have very much, if not the most practice, often do not rank very high, technically, with their professional brothers or with the Bench. The very

best lawyers, technically, do not, as a rule, make marked successes before the public. Every old practitioner knows this. The comparatively high standing of attorneys at law can not depend on success at the Bar, for every cause has a wrong as well as a right side, and it follows that lawyers, as a body, are half of the time wrong in their law or their pleadings or in both. What would be said if engineers could be thus indisputably shown to be wrong in half of all their professional judgments and works?

The comparatively high standing of the legal profession before the public is, therefore, not because of the technical accomplishment of its practitioners nor because of the technical activities of the Bar Association, which is the greater society of attorneys at law, but because they collectively constitute a profession which is, under dominance of the Bench, united in upholding professional dignity in the public eye, and this carries with it a mutual respect and forbearance which prevents such underminings of reputation and standing as occur among engineers.

And substantially the same may be said with respect to physicians. The medical profession does not stand high before the public because of "the activity and progress of its technical work" as evidenced by the doings of the great medical societies. But it does stand high because of the "dignity and forcefulness with which its members conduct themselves, as cultivated men and citizens, before the public."

So the public standing of a great society—engineering, or any other—does not, at the base and bottom, depend on its technical activities, except when its truest foundation of strength before men has been sacrificed or never laid by its members. By and large, the public does not care a rap about the technical accomplishment of the members of such a society, or the technical activities of those combined in the society. Look at the high standing and potent influence with the public of societies of men the members of which have no standing based on learned accomplishment or skilled practice, no notable foundation to rest upon, except that of forceful, broad-minded men taking an active and helpful interest in the affairs of men.

In the opinion of the writer, now one of the oldest members of the Society and one who has had much opportunity for observation on the points of this particular subject, John W. Alvord, M. Am. Soc. C. E., put his finger directly on the seat of the Profession's and the Society's troubles when he wrote the following, which I transcribe in order that I may with better understanding, affix a supplement to it, taken from a letter by this writer to a brother member, written in 1915. Mr. Alvord wrote:

"The most of our troubles come from self-centered narrowness, and what the engineer of to-day lacks is breadth of view, less envy and jealousy, and more interest in the business and political world * * *."

We begrudge other people their success. We begrudge the heads of our Society their notoriety, and we tear down other people's reputations in our profession altogether too freely. We should, I think, pay particular attention to those members of our profession who have done good work."

And here I add my supplement:

"Public recognition of high attainment of one engineer, rightly taken, constitutes recognition of worthiness in the whole profession. If you pull the engineer down who has been so acclaimed, you pull the pedestal down with him, and there are no climbing facilities for the rest of us and no high place fit to rest on when we get there. If the young civil engineers could be brought to thoroughly comprehend the vital bearing of this on their futures, there would be a profession established, worth practicing, in about half a generation. As it is—but why picture the situation? You know what it is in this regard, as well as I do."

We can not have a great engineering society on an enduring basis, without a sound professional body on which to rest it. We can not have such a sound body, except we have sound parts, to compose it. In the end, the public will be the judge, and the great body of engineers must present itself for judgment, in language, so to speak, which the public understands and appreciates, and not in terms peculiar to the "shop".

The public will not rank civil engineers high, as a body, if civil engineers do not, in general, show that they recognize and accord worth in those civil engineers with whom the public has become familiar. We can not maintain a presentable appearance as a body, before the world, so long as considerable numbers of the more active part of our body climb out upon the protuberances from the body and saw them off close to the trunk.

Recently, members of the Bar Association of California made a pilgrimage in large numbers to the home of an aged judge, long retired, but formerly prominent as a lawyer and jurist in the State, just to pay their respects to him on the occasion of his birthday. The participants in this pilgrimage were, for the most part, men who had been the youngsters when the judge was on the Supreme Bench, or men admitted to the Bar after his retirement. All were eager to do him honor, though few were acquainted with him, simply because he exemplified high public recognition of the profession, and, notably, had held up the tone of the profession before the public. Such was the talk among the pilgrims. In this case, the Bar Association honored itself, in public estimation, as well as the most worthy jurist. Precedents for the action were cited with pride. Has anything of this character ever happened among engineers? If not, perhaps it has been because no engineer has attained to such standing for a like reason; and, if this be so, maybe it has been because engineers,

in practical ways, have discouraged their fellows from climbing on that kind of a ladder. The public notices such happenings as that lawyers' pilgrimage, to the credit of those participating.

Referring to the Committee's report, under the heading "Membership", if this is a society of civil engineers what is the object of having as a member of any class, under any name, "a person who by scientific or professional attainment has qualified himself in his special pursuit to advise and co-operate with civil engineers in the advancement of professional knowledge and practice"? Such a person may be eminently well qualified as a lawyer, doctor, dentist, veterinarian, chemist, botanist, entomologist, astrologist, archæologist, or other "special pursuit", and may, "by scientific and professional attainment", have fitted himself "to advise and co-operate with civil engineers in the advancement of professional knowledge and practice". But the question naturally arises as to what professional knowledge and practice—that of his own specialty, or that of civil engineering? If the latter, the clause should so state.

But, in all fairness and explicitness, would it not be better to be entirely frank in defining the qualification of those eligible as Fellows, and put the matter as follows:

"Lawyers, doctors, dentists, veterinarians, chemists, botanists, entomologists, astrologists, archæologists, and those following other special pursuits, and who by scientific and professional attainment in their specialties, have qualified themselves to advise and co-operate with civil engineers in the advancement of civil engineering professional knowledge and practice, shall be eligible as Fellows of the American Society of Civil Engineers."

True, this would constitute a good deal of an acknowledgment of weakness and inferiority on the part of civil engineers, but it would have the merit of appearing to be straightforward, bold, and frank, which merit the proposal of the present Committee in the view of the writer, does not have. No one will suppose, of course, that there has been any thought of not being straightforward, bold, and frank, but the intelligent part of the public will not recognize either the immediate or the ultimate object of the clause, will not know whether there is or is not a hidden object.

For instance: The lawyers, doctors, dentists, etc., if they give the matter a moment's attention, will want to know whether they, because of accomplishment in their specialties, are to be considered as qualified to advise and co-operate with civil engineers in the advancement of civil engineering professional knowledge and practice; whether civil engineers, for a precisely similar reason, may not consider themselves qualified to advise with lawyers, doctors, dentists in the advancement of the lawyers', doctors', dentists', professional knowledge and practice? And, if this be not so, the lawyers, doctors, dentists, etc., will question

why that clause in the Constitution of the American Society of Civil Engineers? To get in contributing members? If so, why was not the former definition of Fellow retained, which in simple, direct language said: "Fellows shall be contributors to the permanent funds of the Society, though they may not be eligible for admission as corporate members"? Or, at least some lawyers, veterinarians, and entomologists will think, with pride, that the civil engineers really need their co-operation and advice in the advancement of civil engineering knowledge and practice, and be frank in saying so. Or again: The dentists, botanists, and astrologists may think that the civil engineers are extending to them, in common with the memberships of all other peoples of professional and scientific attainment, an invitation to join, as Fellows, in a crusade for the advancement of professional knowledge and practice of all kinds and descriptions.

Exactly the same question might be raised with respect to "such persons engaged generally in commercial pursuits as possess engineering training and experience qualifying them to be of service to the engineering profession". Why are these affiliates? Does the Society actually need them? And, if so, for what reason? Does it need to absorb into its body all who have color of special ability "to be of service to the engineering profession"? For, if it takes in one person so qualified, it should, in justice and reason, take all; and who can count them in the world, and what would the Society be with them? We can not burden the public mind with all these distinctions between Members, Associate Members, Juniors, Fellows, Associates, and Affiliates. Such degrees and variation in degrees of membership are, to the public, befogging, and, before the public, tend to minimize the value of membership in the American Society of Civil Engineers, of every grade and naming.

The presence on the shelves of the office of the vice-president and general manager of the Nutcracker Manufacturing Company of a file of the *Transactions* of the American Society of Civil Engineers, even though he is a gentleman "of scientific attainment in his special pursuit, qualifying him to advise and co-operate with civil engineers in the advancement of professional knowledge and practice", is befogging to far the greater portion of the intelligent (and wealthy) personages who are privileged to enter there. They know that the general manager is not an engineer, and the fact of his special qualifications to advise engineers has escaped them.

Fellowships and other somewhat similar classes of memberships of societies originated in older countries where and when scientific, artistic and most professional people were poor and dependent on the patronage of people of wealth and high position; and in making such people "fellows", or other non-active members of their societies, they were bidding for patronage, and very rightly they received it.

It was all natural and not to be criticised under such circumstances. The circumstances and conditions are very different in this country, now. A great society such as this Society now is should not seek to draw into its fold any class of people who are not eligible for admission as corporate members, or who do not enter the preparatory or waiting classification of Juniors—except those specially distinguished by accomplishment making them worthy for honorary membership. The example of the great associations of lawyers, the great societies of the medical profession, should prompt civil engineers not to cheapen their National organizations through reaching out for those who can not be regarded other than as patrons.

Is it a fact that the "so-ness" of the technical engineer's lines of thought prevents him from seeing how differently many things pertaining to his profession may strike people not of it? It has sometimes seemed to the writer, when he has painstakingly "climbed over the mountain to get the view there", that, even though he saw only "the other side of the mountain" he was amply repaid for his labor, by realizing that in all things very much depends on the viewpoint—the other fellow's viewpoint. If civil engineers, as individuals, will climb over the great obstruction which blocks their advance as a body, and join the crowd looking at the other side of it, though they there see only "the other side of the mountain", they will generally discover that, by being more of psychologists with respect to the public mind and less of technicians with regard to their own, they can locate, construct and operate lines for advancement on easy gradients and without excess curvature, either over or around the obstruction against which they have butted for several generations.

But, so far from clearing the way for general advancement of the engineering profession before the public, there are now rampant certain special influences pertaining to engineering practice which are constantly operating to heap higher the obstructions.

Why are municipal boards of public works not composed, predominantly, at least, of civil engineers? City public works are eminently civil engineering works, and the authorities charged with them should in the public and the taxpayers' interest be composed of civil engineers, just as boards of health are made up of doctors of medicine. If an appointing power named to a board of health a hotel keeper, merchant, or lawyer, the medical profession would protest in formal array, and foremost in the fight against the appointment would be the physicians in charge of the hospitals under the health board, with the plea that their efficiency necessitated supervision by their profession, exclusively. Not so with civil engineers. A city engineer, as a rule, privately if not openly, resents the appointment of another civil engineer to the board of works whose technical expert and executive he is and, apparently, for the reason that he does not want another civil engineer

to be in position to act as a check upon him. This attitude is destructive of the public standing of the profession.

True, men are named to boards of public works chiefly because of political or other influence, to the exclusion of special fitness; but this is because there is no due and competent representation before the public and the appointing power of the fact that civil engineers are the specially competent citizens who, in the public and the taxpayers' interest, should be selected for such duties; and because very many civil engineers discourage members of their profession from putting themselves forward for such preferments, and take occasion, privately, to say that the individual who does it is not much of an engineer, anyhow.

Another point: Great municipal public works, whose cost runs into many millions, are designed and carried out by city engineers without retaining any other engineer in consultation. As a rule, so far as the writer has observed, the city engineer fights off the consulting engineer proposition, as constituting a reflection upon his abilities, or he tries to have his personal friends selected for the consulting service. This is all wrong and damns the profession.

The executive engineer in charge of public works should welcome proposals for consultation, exactly as the doctor of medicine and the surgeon does, only taking care that reputable and able, and not disreputable or weak, consultants be chosen. That is a most potent way to build up the profession and to strengthen and even to save individual reputations. When a law case bids fair to become important or to be tenaciously fought, the original attorneys quickly strengthen their respective sides by bringing in counsel—the strongest they can induce their clients to pay for. When a medical or surgical case develops indications of a serious character, the physician or the surgeon promptly recommends the calling of a diagnostician, a consultant, or a specialist, and his advice prevails.

City attorneys often insist on employing special counsel on the city's more important cases, and see that they are mighty well paid and retained as long as there is need for them. City engineers, as a rule, stave off employment of consultants or engineering specialists even on their most important works, load their pay-rolls with comparatively small and unknown men who bring to them, perhaps, much university acquired technical knowledge, but little of the wisdom of actual experience or observation of experience and who naturally, before the public, can not uphold them and establish public confidence. When an engineer holds a prominent public post, with important design or construction in charge, it is a most important duty to see, through professional and not political support, that he is understood and upheld by the public —his employer. If he will look back and see how many of his fellows have run on rocks and been wrecked, and have dragged down their local professionals with them, by over self-confidence and grasping jealousy,

he will, almost certainly, if there are "no strings on him", call in others to help him, and not merely take his orders.

But perhaps the worst sin, in the line of professional practice, of which civil engineers are often guilty, to their profession's grave injury, is that of secrecy with respect to their works. An employer is of course entitled to privacy for his business, but, even as to such works, a vast and helpful fund of experiences passes on into oblivion each year, which civil engineers would be at entire liberty to formulate and record for the benefit of their profession. While, with respect to public utility works and distinctly public works, the vast sea of nothingness is receiving the run-off of engineering experiences in about the same proportion the seven seas of earth are made catch-alls for the drainage from the continents and islands. The engineers in charge seem to be satisfied to let it go so. The Profession is kept poor in the wisdom which comes with experience, as well as poor in that public recognition which a right exposition of such wisdom would bring.

A specially noxious guilt of this character is to be laid at the doors of many city engineers. They are employed by the local public, and their employers are entitled to prompt and useful accountings for the moneys expended by their plans and under their supervision; and, moreover, the public is entitled to have the instructive technical and practical experiences which follow construction of works, so formulated that the civil engineering profession may to best advantage serve it in the future. But city engineers, all too often, render no such accounting. On the contrary, they seem to look upon the most valuable lessons of their works as a sort of private property; the public becomes impatient, the engineers are suspected and abused, and the profession is incidentally, but decisively, "queered" in the public mind and woefully weakened in the estimation of those most likely to be employers of engineers.

Every law case that goes through the Courts is as an open book to the legal profession; and the Court in its decision tells the right and wrong of it. On such knowledge the profession of the law, in this country, is for the most part built, while its battles and their lessons are in the open. And just so, in a very large degree, is it with medicine and surgery—the hospitals and the medical or surgical colleges and societies gather in the larger and more important parts of the practitioners' experiences, from individuals and through boards of health, and promptly put it before the profession. The literature of the law is voluminous and well systemized, not only in the official Court reports, but in many specialized textbooks. In a lesser degree, perhaps, the literature of medicine and surgery is systemized, detailed, and thorough. By comparison, the reports and digests or special treatises on civil engineering experiences are meager, unsystemized and anything but thorough. A profession must rest, not only on the principles of its

basic science, but on digested records of practice—experiences in the application of those principles. In this regard the civil engineer is woefully handicapped. Whose fault is it?

It is not because of shortage in technical learning that the profession suffers, but from what Mr. Alvord called—"self centered narrowness", and this is exemplified not alone by certain kinds of conduct toward each other, but by practitioners hoarding the results of their experiences for no practical purposes whatever. He who would more fully realize this should run through *Transactions* with a list of the members before him, and see what records most of the men of largest practice have made for themselves. As for the military engineers: Think of the millions on millions of money spent under their direction, on river and harbor works, with practically no digested reports of technical or practical outcome, no treatises, no useful accounts which are really available for the libraries of members of the profession, or, in an easily practical way, even in great public libraries.

Concealment of public works experience and results is sometimes excused on grounds of public policy. In such matters, how can it be good policy to keep from the public knowledge which it has paid for? If it be encouraging, the public should be buoyed up by it; if discouraging, the taxpayers should be privileged to face and make the best of it at once. It is only through concealment and delay that real injury can be inflicted on a great public in such matters. And it is by such concealment and delay that engineers not only ruin themselves, but undermine their profession in public estimation.

There is just now, more than ever, operative another potent influence on the public mind, through what is growing to be a custom in engineering practice, to the serious detriment of American civil engineers and their profession. The profession is worth practicing only so far as the public and employing class of the people think it is worth employing and paying. Anything coming from engineers themselves which directly, explicitly or by comparison, tends to depress the standing of the civil engineer in public estimation, constitutes a distinct injury to the profession. For some years past and, as this writer observes in many instances now, university professors have been and are seeking and obtaining much practice as civil engineers, and holding commissions or appointments, carrying good salaries, from States, cities and other public as well as private or corporate bodies, and even from bureaus of the general Government, while yet retaining positions and emoluments in the faculties of their universities.

These able gentlemen are not known to the public as civil engineers, but as "Professors". This large, round, and learned-like word carries a pregnant meaning to most people, and even very intelligent and influential men of the classes who constantly employ engineers are coming to look upon these "Professors" as some sort of super-engi-

neers by some mysterious process, especially experienced as well as particularly learned. There seems to be an impression growing that results of all engineering experiences are promptly gathered into the universities, and there correlated or digested, and only there is the ripest scientific engineering advice to be had, and service secured.

The writer has been at no little trouble to look into this subject and, having been for years past out of engineering practice, can not be thought to have personal motive when he declares that in his opinion, based on special and somewhat wide inquiry, these "Professor" civil engineers are doing their brother engineers and their profession a very great injury. He knows that among groups of men with money for development works, and men who are directors of operative companies, and among members of legislatures, there are always those who bring forward the "Professor" as the man to be employed or consulted, in preference to the plain civil engineer—apparently for the sole reason that he is a university professor and, presumably, is superior to the man who is not. The writer has even known it to be urged that a "Professor" be employed because, by reason of his university pay and facilities, he could and would do a cheaper as well as a better job.

The "Professor" in his capacity of professor of civil engineering or some related chair in the university, sends out into the professional world each year, several dozen or more graduates from his classes. These young engineers look to him for advice and help, which they usually get, free, and if there is a chance to bring in a consulting engineer on business they can secure or influence, the "Professor" gets the fee; and he not infrequently is willing to take a small one, in order to get the business, on the plea that he thereby secures experience and data which is valuable to bring before his classes, and his classes may learn something practical by helping him. Such talk is widely current among civil engineers, and the writer has good reason to believe that it is well founded.

There naturally ensues, of course, an idea on the part of university governing bodies that salaries of $3 000 to $4 000 or $5 000 per year are sufficient for professors of engineering, because they can acquire as much more by private practice or public employments outside of the university and, as above explained, with advantage to their class men and the university service. It follows that professors may be encouraged in this practice. It certainly does follow that young university-made engineers do not seem to be started into professional life with that respect and deference for those who have built up, by hard work and hard knocks suffered, all there is of it, which is absolutely essential to the unity, concord and team work necessary to uphold the profession before the public. Surely the young engineers can not expect to take precedence. The public never heard of them. There is a new batch coming out every year.

This condition largely results from the fact that university professors of engineering are, in so many notable cases, practitioners of the profession, before the public, and, instead of bringing into their class rooms the notably experienced men of the active profession, to lecture or informally tell of works and the lessons of practice—thus at once recognizing merit in the established profession, and laying the foundation for unity and good understanding between its active members, old and young—they, no doubt without premeditation, undermine and do much to render barren the very field of endeavor they are qualifying their youngsters to work in. If civil engineers would persistently work as a body before legislative, executive, and directing authorities, and finally correct this abuse, they would thereby make a long stride toward better permanent conditions for their profession—a stride which, with several others of like character, is, in the opinion of the writer, absolutely necessary for the attainment of the goal.

The course would be to see that professors of engineering are sufficiently well paid to render wholly unnecessary their having any other source of income. This would set a higher standard of pay for first-class engineering service, would keep the professors out of the civil practice field, and should not be so much of a burden on the universities because, if a professor devotes all of his time to his university work, manifestly he should require somewhat less expensive assistance.

This writer has heard a member of a university governing body state that, while it certainly was most desirable to pay professors, in general, full living salaries, it was not so with respect to professors of engineering, because they could get other revenue by practicing their calling before the public, and could bring the business into their class rooms to the great benefit of their undergraduates. How is it possible to uphold the civil engineering profession before the public in the face of such ideas in the minds of those who most directly control the situation, and which ideas seem to go, year after year, uncontroverted by the engineering organizations which might correct them.

When the Mayor of a city, the Governor of a State, the President of the United States or any of his cabinet or bureau officers reaches out into university faculties for professors to employ or commission to carry out engineering works, investigations or developments provided for by law, he gives notice either of his ignorance of this situation—which is altogether natural, under the circumstances—or of his willingness to take advantage of it and have the fact proclaimed to the public as a thing greatly to his credit, that he has secured the superior services of Professor So-and-So of the University of Blank, for the important work. That he has snubbed the active practitioners of the engineering profession, deprived them and the profession of a measure of support to which they are entitled and, practically, said to the world either that

they are not professionally able, or personally unworthy of his consideration, never seems to enter his brain.

Who is to blame for all this? Primarily, not the Mayors, nor the Governors, nor the Presidents, nor the cabinet officers, who do the appointing, but the body of civil engineers, who, through inaction, allow such misunderstandings to continue.

Quite a number of years ago, in a certain locality on the Pacific Coast, it became common to employ a crack military band to render the music at civic functions, and even at some of the larger private assemblages. The local band musicians' organization took action, and through the influence of a Congressman the practice was promptly stopped, on orders from Washington. At a still earlier period, Army doctors or surgeons were practicing medicine largely among civilians in the neighborhood of their posts on the Pacific Slope. Local physicians brought the matter before State medical societies, and these carried it to the proper authorities in Washington; and, again, this abuse was stopped. For many years it was the practice of ranking members of the U. S. Engineer Corps, stationed at San Francisco, while still on active duty, to practice the profession in civil life, and they were getting much of the cream of the business. One civil engineer, who himself was well provided with work, in the interest of fellow engineers less fortunate, started a movement to have the military engineers kept within the traces which the Army regulations contained. A number of other engineers joined him, but very soon backed down, and several of them actually joined forces with the enemy, so to speak. The practice went on, until the personnel of the engineers was about all changed; but the civil engineer told the story, as a joke on himself, in Washington—how he was dumped into the ditch by those he had tried to help. The then Chief of Engineers heard of the incident, enquired for particulars, and later sent for the civil engineer and showed him a copy of a circular letter he had sent out, calling attention to the regulation which prohibited Army engineers from taking any outside business, except on special permission and approval for each case.

In all such matters, it is not the money that is directly lost to the civilian practitioner, and gained by the Army engineer or the professor-engineer, which most counts. It is the moral effect on the public mind, to the prejudice of the civil engineering body. The glamour of the military band was what put the civilian band in the shade, and not the superiority of the music made by it; the consequent implanting of the idea that civilian bands were inferior to military bands, constituted the real damage and justified the uproar that was made about the matter. And so it was the dark-blue undress uniform with the military insignia, worn by the Army surgeons in those days, taken with the titles—Colonel, Major, or Captain—by which they were addressed, that eclipsed the civilian doctors, and not any greater suc-

cess in medical practice by the Army men; and it was the implied inferiority of the civilian doctors which unavoidably ensued that justified their protesting.

In the same way it is the belittling of the civil engineer before the public and with employers of engineers that inevitably follows upon Army engineers in active service, and "Professor" engineers in great universities, practicing in the civil engineering field, which does the injury. It is not the money which civil engineers fail to receive, and which "Professor" engineers and military engineers do get; it is the false ideas with which the public and many employers are inoculated and which become cultures in their minds that operate to keep the civil engineer on a comparatively low plane as a professional man.

One only has to be a thoughtful observer of the manners of men amongst men to note the significant difference between the receptions accorded a Colonel of the Engineers, U. S. A., and any local civil engineer of first rank in his profession, before a Chamber of Commerce; or the equally significant difference between the estimation in which a "Professor" engineer and an unadorned civil engineer is held by a committee of the Legislature; and the difference in space accorded to the Colonel and the "Professor", as compared to that given the plain civil engineer, in news columns. These phenomena are to be observed in full display well west of the Atlantic seaboard. The civil engineer who does not realize their deep significance, as affecting his civic standing and his earning capacity, is deficient as a student of the psychology of the crowd.

And still again: It has come to pass that the United States Reclamation Service bureau is looked to by about all of arid America to supply the engineering skill and brains necessary to effect water conservation, irrigation, and flood prevention in that vast region, whether the works are to be paid for by Government, State, or private funds; and, consequently, what should be a great field of engineering activity, worked by men of ripe experience, scarcely exists for independent practicing civil engineers.

That Governmental action in water conservation and irrigation of public arid lands, as well as in flood prevention and in investigating the broad physical problems of the arid region for public information and benefit, is right and necessary, goes without saying. The writer had the honor of being the first engineer in America to start systematic work and propaganda to these ends. As the first State Engineer of California, he conducted one of the two first State irrigation investigations; and as the first civil engineer called by the Director of the U. S. Geological Survey, he later organized, and conducted for all the region west of the Rocky Mountains, the first U. S. Irrigation Investigation out of which the Reclamation Service has since grown.

Thus, the writer was the first to promote and, later, to do practical official public work or service of this character, in a large way, in this country. But when he realizes the extent to which bureaucratic action in these matters is being carried, to the extinguishment, apparently, of the civil engineer in connection with large arid region developments, except as he is an employee of the Governmental bureau, the writer feels that the matter ought to be brought into this discussion for the good of the profession. This tendency simply raises the question whether the civil engineer is or is not to continue existence as a general professional practitioner of any importance whatever, in a large part of this country.

Just where the line limiting bureaucratic engineering should be drawn, and where the civil engineer may begin as a practitioner in a large way, is perhaps difficult to say; but that line, in the opinion of this writer, should not be where, apparently, it is now. Nor should the bureau engineers be embarrassed by having the task of drawing the line placed solely upon them. They must, necessarily, be embarrassed by political, local and private insistence, and thus need help. Therefore, if the task assigned to the Committee on Development covers the subject of the good of the Profession as well as the good of the Society, the relation between bureaucratic engineering and civil engineering should assuredly be dealt with. Within a few years it will be of overshadowing importance.

All such Governmental and State bureaus should work to build up and to strengthen in every way, and not to supplant, the profession in civil life which they represent in official life. Have they done this? Do they do it? Will they do it? If these questions are not to be answered positively in the affirmative, then here is another influence against which the civil engineering profession can not possibly stand without strenuous and decisive action.

If the principal and greater part of the lessons of civil engineering practice in several of the largest fields for civil engineering expansion are to be gathered promptly into Government bureaus and universities and thence by bureau and university engineers put into use afield, after the apparent manner of the present, it can not be possible that civil engineering, as a free profession, can attain to and hold a high place.

The people are coming to look to Government and the universities for civil engineering guidance and service. These fields, under the influence of "pull", will be gradually extended. The engineer, in the eyes of the public, will be just what he appears to be within the bureaucratic or the university setting—a more or less cheap employee, without personal business ambition or the possibility of advancement, except by permit or favor from above, or death or disability of his ranking engineers. The value of the outside engineer will be gauged by the

apparent value of the inside engineer, as fixed by Government or university. The fact that he is on the inside, practically has almost a life position, will be overlooked, and so the free civil engineer will be able to earn for each of six to eight months of the year at the rate per month that the bureau or the university engineer receives for each of twelve months.

The only apparent preventive for this sort of outcome seems to be a united stand, on the part of American engineers in general, and a demand that the technical professions shall be respected, upheld, and fostered, by university and Governmental authorities—city, State, and Federal—rather than undermined, as now. Engineers should take cognizance of the different treatment accorded lawyers and study the reasons for it, and should look well to the movements for self-protection which are in progress all around them.

It may be said that the foregoing constitutes a narrow view of our problem, that civil engineers should rise above such considerations and triumph over such embarassments. This sort of argument has been advanced, to the writer's personal knowledge, for near half a century; meanwhile, civil engineers have had all the opportunity that there could be to rise and to triumph. But by their present showing and what has been called "unrest", they acknowledge failure, while other professions and callings of professional character, by heeding precisely such precepts as are herein written, have made comparative successes before the public, and are not, as professions or learned callings, giving evidence of defeat in the race of life, as are engineers.

Those comparatively few civil engineers who have attained to what may be called the "Professor" engineer grade, in the estimation of great employers and before the public, and others prominent in the specialties of railroad engineering, and the like, or in the employ of great corporations or construction companies, wherefrom the "Professor", the Military, and the Bureau engineers are, by circumstances, debarred, may not see force in the points which the writer tries to present. But the general practitioner in middle life and past, if he is at all a student of human nature, will see much to heed in them; and when he has spent years in retirement—so to speak, "on the other side of the mountain"—he will probably agree with the writer's views, heartily.

For the good of the profession, and consequent strengthening of the American Society of Civil Engineers, look first to the points which affect the profession's standing with the public, as these points are seen with the eyes of the public.

J. P. HALLIHAN,* M. AM. SOC. C. E. (by letter).†—The report of the Committee on Development indicates that the majority of the members of the Committee, and (as the non-resident members of the Committee

* New York City.

† Received by the Secretary, December 12th, 1919.

were in the majority) a majority of the non-resident members of the Society, are in favor of an extension of the activities of the Society to the end that it may wield a direct influence in civic, State, and National affairs.

As understood by the writer, it is proposed to accomplish this result by an extension of the principle of the Engineering Council, composed of representatives of the four Founder Societies, to all local associations of engineers, constituting in effect, District Committees of the Council.

The writer is in entire sympathy with this plan and has no doubt that it can ultimately be worked out in a satisfactory manner. He believes that any plan that brings the members of the various branches of engineering closer together, that promotes greater interchange of thought and in particular a wider personal acquaintance, will greatly benefit the profession as a whole. Particularly is he impressed with the proposal to convert the lower floor of the Engineering Societies Building into a reading room and club room, where a visiting member or guest may be made to feel at home.

However, in carrying out these clearly sensible ideas, why is it necessary to disturb the technical activities of the Society by discontinuing the semi-monthly meetings at the National Headquarters in New York, and as well the preparation and publication of the *Proceedings?* The membership of the Society now totals more than 9 000, of which over three-fourths are non-resident. The only means these members have of keeping in touch with the affairs of the Society is through the medium of the *Proceedings,* which reaches them once a month. Few of these may be contributors, either in the form of original papers or in discussion, but the large majority are careful readers of both papers and discussions, and apply in their work the principles of engineering in accord with the best thought and methods developed in the forum of the National Headquarters.

It would appear unwise to change this situation until it is certain that something better can be offered. It is suggested that papers be presented for discussion to the local sections and that those of importance warranting publication be published in *Transactions* at the end of the year. This plan would restrict the audience to the local section until the publication of the *Transactions,* and would correspondingly reduce the value and interest of the discussions. In this connection it may be noted that *Proceedings,* being of a convenient size, is carried about on journeys and read. *Transactions* goes into the library as a reference book.

It is doubtful if many of the local sections will see their way clear to financing the publication of papers and discussions. Their membership is limited, no greater percentage of it is active than is the case with the National organization, and the majority of the non-resident members of the Society do not belong to local associations. Particularly

is this true of members employed in foreign work, whose number may reasonably be expected to increase if American bankers follow the British policy of looking after their foreign investments.

It would seem to be much safer to retain the present method of technical activity, extending it, however, to permit the presentation of papers to the local section simultaneously with their offering to the Board of Direction.

On the other hand, the extension of social features, of greater fraternization among the members of the various branches of the profession to the end that they may speak with a united voice in civic affairs, is of such far-reaching importance that it merits being taken up as a separate activity. By itself, as a movement for the general welfare of engineers, it would speedily justify all the help the Society could offer, and a reasonable increase in dues of all members for this specific purpose on a definite programme of action would no doubt meet with general approval.

J. L. VAN ORNUM,* M. AM. SOC. C. E. (by letter).†—The report of the Committee on Development seems to the writer to be so admirable in its general provisions that only the best of reasons would justify dissent from any of its conclusions. His conception of the purpose of student societies and his personal experience with their functionings, however, constrain him to protest against the adoption of the section, B-4, entitled "Student Societies", of the report of that Committee.

If the object of student societies was mainly that of hearing addresses, the writer would heartily favor the recommendation; but he is very sure that this benefit constitutes only a subordinate portion of the field of service that such a society offers to the engineering student, when it is properly organized. A student society, instead of being constituted mainly for the purpose of giving its members the opportunity to learn passively what they may from addresses, etc., may and should serve to supplement the courses of instruction in a much broader and more effective way by particularly encouraging their initiative, judgment, and realization of personal responsibility for their own preparation for their profession. A few illustrations will render this conception more definite.

One important part of the experiences of an undergraduate should be his personal co-ordinating of the class-room training with practical engineering work. This is difficult to accomplish. In a few schools of engineering it is done by establishing alternating short periods of school and shop. In a majority, the only recourse is for the student to engage in engineering work during his summer vacation. It is not easy, generally, to induce undergraduates diligently to adopt this

* St. Louis, Mo.

† Received by the Secretary, December 17th, 1919.

system; but when the student society itself systematically arranges the programme of a portion of its meetings to hear reports from its own members on their summer's work, and then to discuss and criticize them, there results an appreciation of the value and importance of utilizing in this way all their available time that is very real, because it is evolved from their own growing perception of its indispensability.

Another need is that students should have training in speaking, so that they may present their conclusions and convictions convincingly. The writer believes that this, also, requires the student's own recognition of its importance in discipline. In many engineering schools argumentation has no place in the curriculum. In addition to the incitement toward this object by the procedure outlined in the preceding paragraph, the setting apart (periodically) of other meetings of the student society to hear and discuss reports, made by designated members on selected articles in engineering periodicals, will give additional opportunity for this kind of training.

A third need, which requires all the encouragement possible, is that students should grow to realize the importance of constant contact with publications "in order to secure a large fund of facts with which to reason effectively", etc. The plan mentioned in the last paragraph greatly aids in developing this habit.

These three examples illustrate a few of the ways in which untrammeled student societies do definitely supplement the class work of the schools in a very advantageous way. The essential feature of it all is that its vitality and effectiveness depend on the student's own progressive discernment of his needs and the consequent encouragement of individual resourcefulness to supply those needs. This fundamental advantage is taken from him unless a majority of the meetings are of such a nature that he is given the opportunity to develop his own powers, largely by his own efforts. Certainly, the present aspect of engineering education displays more opportunity for giving the student information from above than it does in encouraging the very significant function of self-discipline.

If student societies ought to have the chance to develop along the lines indicated, they must be differentiated among the various branches of civil, electrical, mechanical, mining, chemical engineering, etc. Otherwise the student's interests and enthusiasm will be dissipated over so broad a field that they will become so very tenuous that comparative impotence will result. If mature men have proved, by experience, the wisdom of having both National and local engineering societies divided among the principal branches, how much greater is the need of a similar differentiation for student societies the members of which are yet immature in all those qualities that are essential to prevent "breadth" degenerating into superficiality or dilettanteism.

The writer greatly hopes that the Society will substitute a plan favoring student societies in each of the principal branches of engineering with provision for joint meetings, at intervals, to hear addresses and other purposes where concerted action is desirable. This character of organization would be similar to that of the National Societies, having their individual activities, with Engineering Council (or the National Engineering Organization proposed in the same report of the Committee on Development) to represent those interests common to all. Incidentally, such action would bring into harmony the provisions of Section 4 of page 8 with the purport of Section 5 of page 17 of that report (especially as elucidated in the last two lines).

ITEMS OF INTEREST

The Committee on Publications will be glad to receive communications of general interest to the Society, and will consider them for publication in *Proceedings* in "Items of Interest". This is intended to cover letters or suggestions from our membership covering matters which are not of a technical character. Such communications, however, must not be controversial or commercial.

NATIONAL SERVICE COMMITTEE OF ENGINEERING COUNCIL

In response to frequent expressions of need, Engineering Council announces the establishment of a National Legislative and Departmental Information Service for engineers in all branches of the Profession. Information relative to engineering statistics, research, and construction, as well as of matters before Congress involving engineering considerations, will be furnished without charge by addressing the National Service Committee, M. O. Leighton, Chairman, 502 McLachlen Building, Washington, D. C. The National Service Committee also announces that its office at Washington is open to members of the Society at all times, and that accommodations can be had there at short notice for committee meetings of the Society, or of any organization in which the Society is interested, which may be held in Washington.

ACTIVITIES OF ENGINEERING COUNCIL

Registration of Engineers

Because of widespread and persistent interest in the subject of licensing or registering engineers, architects and surveyors, Engineering Council, at its meeting of October 25th, 1918, authorized the creation of a committee to make a thorough study and submit a report. Fifteen engineers from all parts of the country and of long experience in the various branches of the profession of engineering were appointed as members of this committee, as follows: T. L. Condron, Chairman, Francis C. Shenehon, Farley Gannett, John H. Dunlap, Caleb M. Saville, A. Lincoln Fellows, C. H. Snyder, Bion J. Arnold, John W. Alvord, and J. W. Woermann, of the Society, and A. M. Schoen, Arthur M. Greene, Jr., James H. Herron, John Klorer, and Amos Slater.

After much hard work extending through fourteen months, the committee presented a report to Engineering Council at its meeting December 18th, 1919. This report is accompanied by a "Recommended Uniform Registration Law, to regulate the practice of professional engineering, architecture and land surveying". Council voted to receive this report and to give it immediately, together with the pro-

posed law, as wide publicity as could be secured with the aid of the engineering and architectural societies and the technical journals, in order that the members of these professions might be informed and discussion elicited to guide Council in the consideration of this important matter at its meeting in February, 1920. Engineering Council has as yet taken no action upon the merits of the question of the advisability of legislation providing for the registering or licensing of practitioners of the professions named.

REPORT BY COMMITTEE ON LICENSING ENGINEERS, DECEMBER, 1919

During the past fourteen months, this committee has had under consideration and study the subject of the licensing or registration of engineers. The fifteen members of the committee, as appointed by Council, were selected from thirteen States, *viz.*, Connecticut, New York, Pennsylvania, Ohio, Georgia, Louisiana, Illinois, Missouri, Iowa, Minnesota, Colorado, California, and Washington, and therefore represent practically all sections of the United States, as well as mechanical, electrical, mining, hydraulic, municipal, sanitary, railway and structural engineering, and also colleges of engineering.

The first work of the committee was to investigate the general subject and to collect, so far as possible, available material bearing upon the subject in hand, including opinions from many engineers as to the need or desirability of legislation, as well as copies of all State laws passed and proposed, having to do with licensing or registration of engineers, architects and surveyors.

This preliminary investigation disclosed that very pronounced views were held by engineers throughout the country, both for and against State licensing or registration. The general sentiment one year ago was more opposed to such measures than it is to-day. The older members of the profession did not, as a rule, favor licensing nor did they feel there was need for State regulation of engineering practice, while among the younger men there was a feeling that licensing or registration by the States would add prestige to professional engineers and in many ways benefit the profession, as well as individual engineers.

The advantages claimed for State licensing or registration are the same as those presumably gained by the laws regulating the professions of law and medicine, namely, that those who are incompetent and unqualified professionally to practice are unable to obtain certificates or licenses and hence both the public and the profession are protected. On the other hand, those engineers who have already attained to recognized professional standing feel that they not only do not need the benefits claimed for such legislation, but they fear that State licenses or certificates of registration are apt to put the seal of State endorse-

ment on men who do not deserve it and that the public would assume that a licensed or registered engineer was thereby certified by the State as fully qualified, regardless of what might or might not be the requirements demanded before a license or certificate was granted.

However, the question has gone beyond the stage of debate, for already nine States* have enacted laws licensing or registering engineers, and other States are certain to enact similar laws during the present or coming sessions of their Legislatures. In addition to these nine laws governing engineering practice, there are at least six States that require the licensing or registration of land surveyors and in at least eighteen States† laws have been passed licensing or registering architects. Some of the nine laws are so drawn as to include both engineers and surveyors and some include engineers and architects and one or two include engineers, architects and surveyors. Moreover, these laws are not at all uniform, and in several instances are likely to prove seriously embarrassing and annoying to engineers whose activities extend beyond the limits of a single State. Because of the nature of professional engineering work, the practice of an engineer frequently extends over several States and therefore it is vitally important if there are to be State regulations for engineering practice, that these regulations be made uniform so far as possible and that the Engineering Profession unite in wisely directing such legislation.

As stated, laws have been passed in seventeen States for licensing or registering architects and the American Institute of Architects has endorsed and advocated such legislation, considering that both the architects and the general public are benefited thereby. Unfortunately, some of the laws for licensing architects have been so drawn as seriously to interfere with legitimate engineering practice and the "model law" proposed and advocated by the American Institute of Architects contains definitions of "architecture" and "building" which, should such laws be passed and enforced, would prevent any one but a "registered architect" from planning or supervising the construction of any structure or any of the appurtenances thereto; consequently under this head would come a structure having simply foundations and girders, whether "with or without appurtenances". Under this model law, proposed by the American Institute of Architects no one but a registered architect shall prepare plans for or supervise the construction of a building, and a "building" is thus defined in Section 19:

"A building is any structure consisting of foundations, floors, walls, columns, girders, and roof, or a combination of any number of these parts, with or without other parts or appurtenances."

* Colorado, Florida, Idaho, Illinois, Iowa, Louisiana, Michigan, Oregon, and Wyoming.

† California, Colorado, Florida, Idaho, Illinois, Louisiana, Michigan, Montana, New Jersey, New York, North Carolina, North Dakota, Oregon, Pennsylvania, South Carolina, Utah, Washington, and Wisconsin.

Since none but a registered architect shall have the right to design or supervise the construction of any structure, or any appurtenance thereto, this matter becomes of vital importance to mechanical, electrical, sanitary and mining engineers, as well as to structural engineers.

In the State of Illinois a similar law for licensing architects was passed several years ago, the rigid enforcement of which made it necessary for engineers to unite in having a "structural engineers' license law" passed by the Legislature, and now there are two laws in force in Illinois, one for architects and the other for structural engineers.

In some States, the laws enacted and proposed are intended to regulate the practice of architecture, while in the other States laws have been enacted the purpose of which is simply to protect the term "architect", but not intended to regulate the practice of architecture. In Wisconsin and several other States no one may use the title "architect" without first obtaining from the State a certificate of registration as a "registered architect", but any one not an architect may prepare plans and supervise construction provided he does not style himself an "architect".

Therefore this committee at its meeting of October 13th, 1919, adopted the following resolution, which was carried unanimously.

"Motion: The following is the sense of this committee relative to the desirability of a law licensing or registering engineers:

"Resolved: The enactment of legislation to provide for the registration of professional engineers is desirable and necessary. Ten* States have already enacted such legislation. Laws licensing architects have been enacted in several States and similar laws endorsed by the American Institute of Architects, are pending in several other States, which, if enacted, would prohibit engineers from continuing their customary and recognized practice."

This committee has made a very careful study of definitions for "engineer", "engineering", "architect" and "architecture", but it was found that any definitions for engineering would be so general as to include too much, or too specific to be sufficiently general, or too voluminous to be suitable to incorporate in a law. Some have endeavored to include in a definition of "engineering practice" all sorts and kinds of construction work, but engineering includes investigations as well as plans and no catalogue can well be prepared sufficiently detailed to include all sorts of engineering activities. Several definitions are included in the appendix to this report, and it will be seen that both engineering and architecture are broad terms involving construction and necessarily there can be no sharply drawn distinction. Architects in the broadest sense are engineers even if usually architecture is associated with ideas of artistic or decorative features. Architects are

* Upon later information, this is reduced to nine.

eligible to membership in the American Society of Civil Engineers and several architects are members.

The only basis on which the practice of any profession may be subject legally to State regulation is "in order to safeguard life, health and property". The State may not dictate that any one without a particular kind of artistic talent or without a tenor voice may practice engineering or architecture, but it may legally require that no one shall practice architecture or engineering who is ignorant of the effects of loads and applied forces or incapable of determining the stresses in structures due to loads and applied forces and unable properly to proportion materials in structures safely to sustain such loads and forces.

Land surveying does not involve matters that would ordinarily jeopardize life and health, but property rights are vitally affected by land surveying, and many States have deemed it essential to place restrictions and safeguards about the practice of land surveying. Land surveying is associated with both engineering and architectural practice.

This committee has therefore deemed it advisable and to the best interests of all concerned to include in one law provisions for the registration of engineers, architects and land surveyors. It has recognized that the practices of engineering and architecture overlap in many instances, especially in connection with the larger projects of modern structures, where many branches of the arts and sciences are combined, involving architecture, structural, mechanical, electrical, sanitary, and other lines of engineering.

There are ample reasons why architects alone should judge as to the qualifications of those desiring to practice architecture and why engineers alone should pass upon the qualifications of those desiring to practice engineering. Hence a bill for legislation has been drafted by the committee along these lines and it is confidently hoped that the objections expressed by the American Institute of Architects against laws which might provide jointly for the registration of engineers and architects will be overcome by the terms of the bill herewith submitted.

In fixing the qualifications for registration in the proposed bill, these have been purposely made high, but they have not been made unnecessarily difficult for reasonably competent men to meet. It is not intended that candidates would ordinarily be subjected to written examinations, but rather that the board of registration would pass upon the sufficiency of the professional record of each candidate. Minimum qualifications have been clearly set forth, which must be met. In order to enable the board to pass upon candidates fairly, certain qualifications are specified as "prima facie evidence of fitness" which (unless other facts derogatory to a candidate are also in evidence) will permit the board to pass the candidate. This so-called "prima facie evidence" is not required, but if the candidate can present such evi-

dence his application is the more readily passed upon. For instance, a candidate need not be a graduate of a college of engineering or architecture, but if he is, it is to his advantage. Likewise a candidate need not be a full member of one of the National technical societies or institutes, but if he has won such full membership it is greatly to his professional advantage.

In the preparation of this bill an experienced research engineer, Capt. Raymond J. Roark, was first employed to assist the chairman, and a preliminary draft prepared, based upon a comprehensive study of all the data and existing and proposed legislation available. This draft was then discussed and revised by the three Chicago members of the committee and the Chicago member of Council. It was then sent to each of the fifteen members of the committee for comments and amendments. After these communications had been received by the chairman and had all been collated, a meeting of the entire committee was called and held in Chicago, attended by eight members, Messrs. Arnold, Dunlap, Condron, Shenehon, Slater, Snyder, and Woermann, and Mr. Loweth, of Engineering Council.

Fourteen sessions were held in the five days, with a stenographic reporter present and all of the communications, as well as additional data gathered by the chairman, were carefully studied and a complete revision of the original draft was made, which draft met the unanimous approval of all the members in attendance. This later draft was carefully edited and sent to the entire committee for approval or amendment, subject to a final editing by the chairman and Mr. Shenehon.

The committee unanimously approved the bill as sent out, with minor suggestions for guidance in the final editing. This editing is now completed and the bill is submitted to Council with this report and with the recommendation that Council approve and endorse the same as a bill for an act of legislation in each and every State, for the regulation of the practice of engineering, architecture and land surveying. The bill, as tentatively proposed, is as follows:

Recommended Uniform Registration Law

Title.—An Act to regulate the practice of professional engineering, architecture and land surveying.

[Note: (*a*), In certain States further amplification of title may be required by law; (*b*) The brief terms "professional engineering", "architecture" and "land surveying" give simpler and clearer understanding of the activities affected by this act than any definition—Such definitions as have been devised have proven academic, difficult of proper inclusion and exclusion, confusing, laborious and frequently of great length; (*c*) Architectural work is basicly engineering, with an aesthetic element added. The architect is of nearer kin to the

structural engineer than is the electrical engineer. The model architectural definition of a building is that of an engineering structure. Architects form part of the membership of the American Society of Civil Engineers. Laws for the registration of architects and engineers must be either in parallel or in common. Assuming the best interests of each to lie in co-operation, and having in mind economical administration of a law, both are included in this act. Surveying is a function of engineering, but land surveying deals with land measurements involving property rights.]

The People of the State of ..... enact:

Section 1.—In order to safeguard life, health and property, any person practicing or offering to practice professional engineering, architecture or land surveying in this State shall hereafter be required to submit evidence that he or she is qualified so to practice, and shall be registered as hereinafter provided, and from and after..... months after this Act becomes effective, it shall be unlawful for any person to practice or to offer to practice professional engineering, architecture or land surveying in this State, unless such person has been duly registered under the provisions of this Act.

[Note: (*d*), The constitutionality of this law is based on its promoting the public welfare by safeguarding life, health and property.]

Section 2.—Nothing in this Act shall be construed as requiring registration for the purpose of practicing professional engineering, architecture or land surveying by an individual, firm or corporation on property owned or leased by said individual, firm or corporation unless the same involves the public safety or health.

[Note: (*e*), Obviously no modern agriculturist should be prohibited from laying out and building the ditches or roads on his farm, or planning and building his own barn.]

APPOINTMENT OF THE BOARD

Section 3.—To carry out the provisions of this Act there is hereby created a State Board of Registration for professional engineers, architects and land surveyors, hereinafter called the "Board", consisting of seven members, who shall be appointed by the Governor within sixty days after this Act becomes effective. At least three members shall be professional engineers, and at least three members shall be architects. Not more than one member of said Board shall be from the same branch of the profession of engineering. The members of the first Board shall be appointed to serve for the following terms: Two members for one year; two members for two years; two members for three years,

and one member for four years; said terms ending on the first day of .....of the succeeding years. On the expiration of each of said terms the term of office of each newly appointed or reappointed member of the Board shall be for a period of four years and shall terminate on the first day of ..... Each member shall hold over after the expiration of his term until the successor shall be duly appointed and qualified. The Governor may remove any member of the Board for misconduct, incompetency or neglect of duty. Vacancies in the membership of the Board, however created, shall be filled by appointment by the Governor for the unexpired term.

Qualifications and Expenses

Section 4.—Each member of the Board shall be a citizen of the United States and a resident of this State at the time of his appointment. He shall have been engaged in the practice of his profession for at least ten years and shall have been in responsible charge of work for at least five years. He shall be a member in good standing of a recognized society of professional engineers or architects, and except as provided in Section 5, shall be a registered professional engineer or a registered architect. Each member of the Board shall receive ..... dollars ($.....) per day for attending sessions of the Board or of its committees, and for the time spent in necessary travel, and, in addition, shall be reimbursed for all necessary traveling, incidental and clerical expenses incurred in carrying out the provisions of this Act.

[Note: (*f*), The per diem allowance of each member of the Board is not expected to be adequate compensation. High-grade professional men are expected to serve as a matter of good citizenship.]

Certificates, Privileges and Powers of the Board

Section 5.—Each member of the Board shall receive a certificate of appointment from the Governor, and before beginning his term of office he shall file with the Secretary of State the constitutional oath of office. Each member of the Board first created shall receive a certificate of registration under this Act from the Governor of this State. The Board or any committee thereof shall be entitled to the services of the Attorney General, in connection with the affairs of the Board, and the Board shall have power to compel the attendance of witnesses, may administer oaths and may take testimony and proofs concerning all matters within its jurisdiction. The Board shall adopt and have an official seal which shall be affixed to all certificates of registration granted; and shall make all by-laws and rules not inconsistent with law needed in performing its duty. Suitable office quarters shall be provided by the State for the use of the Board in the City of.....

ORGANIZATION AND MEETINGS OF THE BOARD

Section 6.—The Board shall hold a meeting within thirty days after its members are first appointed, and thereafter shall hold at least two regular meetings each year. Special meetings shall be held at such times as the by-laws of the Board may provide. Notice of all meetings shall be given in such manner as the by-laws may provide. The Board shall elect annually from its members a chairman, a vice-chairman and a secretary. A quorum of the Board shall consist of not less than two engineer and two architect members.

RECEIPTS AND DISBURSEMENTS

Section 7.—The secretary of the Board shall receive and account for all moneys derived from the operation of this Act and shall pay them to the State Treasurer, who shall keep such moneys in a separate fund to be known as the "Fund of the Board of Registration for Professional Engineers, Architects and Land Surveyors", which fund shall be continued from year to year and shall be drawn against only for the purpose of this Act as herein provided. All expenses certified by the Board as properly and necessarily incurred in the discharge of its duties, including authorized compensations, shall be paid out of said fund on the warrant of the Auditor of the State issued on requisitions signed by the chairman and the secretary of the Board; provided, however, that at no time after this Act has been in effect for one year shall the total of warrants issued exceed the total amount of funds accumulated under this Act. The secretary of the Board shall give a surety bond satisfactory to the State Treasurer conditioned upon the faithful performance of his duties. The premium on said bond shall be regarded as a proper and necessary expense of the Board.

[Note: (*g*), The administration of the law is made ultimately self-supporting. The Legislature is not expected to appropriate money to accomplish the results contemplated.]

RECORDS AND REPORTS

Section 8.—The Board shall keep a record of its proceedings and a register of all applicants for registration showing for each, the date of application, name, age, educational and other qualifications, place of business and place of residence, whether or not an examination was required and whether the applicant was rejected, or a certificate of registration granted, and the date of such action. The books and register of the Board shall be prima facie evidence of all matters recorded therein. A roster showing the names and places of business and of residence of all registered professional engineers, architects and land surveyors shall be prepared by the secretary of the Board during the month of ..... of each year; such roster shall be printed by the

State out of the fund of the Board as provided in Section 7, and a copy mailed to and placed on file by the clerk of each incorporated city, town and county in the State. On or before the ..... day of..... of each year the Board shall submit to the Governor a report of its transactions for the preceding year, and shall file with the Secretary of State a copy of such report together with a complete statement of the receipts and expenditures of the Board, attested by the affidavits of the chairman and the secretary, and a copy of the said roster of registered professional engineers, registered architects and registered land surveyors.

APPLICATIONS FOR AND ISSUANCE OF CERTIFICATES

Section 9.—The Board shall, on application therefor, on prescribed form and the payment of a fee of ..... dollars ($.....), issue a certificate of registration:

[Note: (*h*), The application required should include a complete statement of an applicant's education and a detailed summary of his technical work. The statements made should be under oath, and should be supported by the recommendations of not less than two professional engineers, architects or land surveyors as vouchers.]

1.—To any person who submits evidence satisfactory to the Board that he or she is fully qualified to practice professional engineering, architecture or land surveying; or

2.—To any person who holds a like unexpired certificate of registration issued to him or her by proper authority in any State or territory of the United States, or in any province of Canada, in which the requirements for the registration of professional engineers, architects or land surveyors are of a standard satisfactory to the Board;

Provided, however, that no person shall be eligible for registration who is under twenty-five years of age, who is not a citizen of the United States or Canada, or who has not made declaration of his or her intention to become a citizen of the United States, who does not speak and write the English language, who is not of good character and repute, and who has not been actively engaged for six or more years in the practice of professional engineering, architecture or land surveying of character satisfactory to the Board. However, each year of teaching, or of study satisfactorily completed, of engineering or architecture in a school of engineering or architecture of standing satisfactory to the Board, shall be considered as equivalent to one year of such active practice.

[Note: (*i*), The functions of the Board are largely administrative and judicial. The burden of presenting evidence of qualification is placed upon the applicant. The Board may in doubtful cases give technical examina-

tions; but the clear intent is to utilize other State agencies, as for instance the Engineering or Architectural schools, to submit as evidence the results of examinations, with recommendations as to competency.]

Unless disqualifying evidence be before the Board, the following facts established in the application shall be regarded as prima facie "evidence, satisfactory to the Board", that the applicant is fully qualified to practice professional engineering, architecture or land surveying:

[Note: (*j*), When the law goes into effect a large percentage of practicing engineers, architects and land surveyors will be registered to preserve the status quo. Long-continued practice, graduation from a technical school of approved standing with subsequent years of practice, or membership in high-grade technical societies, in the absence of disqualifying facts, is accepted as prima facie evidence of qualification, as stated below.]

(*a*) Ten or more years of active engagement in professional engineering, architectural or land surveying work;

(*b*) Graduation, after a course of not less than four years, in engineering or architecture, from a school or college approved by the Board as of satisfactory standing, and an additional four years of active engagements in professional engineering, architecture or land surveying work;

(*c*) Full membership in the American Institute of Architects, American Society of Civil Engineers, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Naval Architects and Marine Engineers, or such other National or State engineering or architectural societies as may be approved by the Board, the requirements for full membership of which are not lower than the requirements for full membership in the professional societies or institutes named above.

Applicants for registration, in cases where the evidence originally presented in the application does not appear to the Board conclusive or warranting the issuance of a certificate, may present further evidence which may include the results of a required examination, for the consideration of the Board.

[Note: (*k*), The standard of qualification is set high for two reasons: The public welfare will be better promoted by maturer competency; and the prestige attaching to the term "Registered" will be more significant for the

professional men themselves. In requiring the younger, less experienced men to serve somewhat longer as assistants or understudies to older men, no hardship is imposed which will not be compensated by the fuller return in recognition when registration is achieved.]

In determining the qualifications of applicants for registration as architects, a majority vote of the architect members of the Board only, shall be required; and in determining the qualifications of applicants for registration as professional engineers or land surveyors, a majority vote of the engineer members of the Board only, shall be required.

[Note: (*l*), The acceptance for registration of engineers by the engineers on the Board, and of architects by the architects on the Board, places the judicial finding of fitness or unfitness in the hands of those best qualified to judge. In administrative matters and in the revocation of certificates, the Board acts as a unit.]

In case the Board denies the issuance of a certificate to an applicant, the registration fee deposited shall be returned by the Board to the applicant.

Certificates of registration shall expire on the last day of the month of ..... following their issue or renewal and shall become invalid on that date unless renewed. It shall be the duty of the secretary of the Board to notify by mail every person registered hereunder of the date of the expiration of his certificate and the amount of the fee required for its renewal for one year; such notice shall be mailed at least one month in advance of the date of the expiration of said certificate. Renewal may be effected at any time during the month of ..... by the payment of a fee of ..... dollars to the secretary of the Board. The failure on the part of any registrant to renew his certificate annually in the month of.....as required above shall not deprive such person of the right of renewal thereafter, but the fee to be paid for the renewal of a certificate after the month of.....shall be increased 10% for each month or a fraction of a month that payment for renewal is delayed; provided, however, that the maximum fee for a delayed renewal shall not exceed twice the normal fee.

[Note: (*m*), The amount of the fee to be paid by a registrant must be established by each State in the light of the number of fees to be expected, and the cost of administration.]

Revocation and Reissue of Certificates

Section 10.—The Board shall have the power to revoke the certificate of registration of any professional engineer, architect or land

surveyor registered hereunder who is found guilty of any fraud or deceit in obtaining a certificate of registration or of gross negligence, incompetency or misconduct in the practice of professional engineering, architecture or land surveying. Any person may prefer charges of such fraud, deceit, negligence, incompetency or misconduct against any professional engineer, architect or land surveyor registered hereunder; such charges shall be in writing and sworn to by the complainant and submitted to the Board. Such charges, unless dismissed without hearing by the Board as unfounded or trivial, shall be heard and determined by the Board within three months after the date on which they are preferred. A time and place for such hearing shall be fixed by the Board. A copy of the charges, together with a notice of the time and place of hearing shall be legally served on the accused at least thirty days before the date fixed for the hearing, and in the event that such service cannot be effected thirty days before such hearing, then the date of hearing and determination shall be postponed as may be necessary to permit the carrying out of this condition. At said hearing the accused shall have the right to appear personally and by counsel and to cross-examine witnesses against him or her and to produce evidence and witnesses in his or her defense. If after said hearing five or more members of the Board vote in favor of finding the accused guilty of any fraud or deceit in obtaining a certificate or of gross negligence, incompetency or misconduct in the practice of professional engineering, architecture or land surveying, the Board shall revoke the certificate of registration of the accused.

The Board may reissue a certificate of registration to any person whose certificate has been revoked, provided five or more members of the Board vote in favor of such reissue for reasons the Board may deem sufficient.

The Board shall immediately notify the Secretary of State and the clerk of each incorporated city, town and county in the State of its findings in the case of the revocation of a certificate of registration or of its reissuance of a revoked certificate of registration.

[Note: (*n*), Revocation is recognized as a serious procedure in its effect on professional reputation, and the right of hearing and contest is recognized and provided for.]

A new certificate of registration to replace any certificate lost, destroyed or mutilated, may be issued, subject to the rules and regulations of the Board. A charge of one dollar shall be made for such reissue.

SIGNIFICANCE OF CERTIFICATE—SEALS

Section 11.—The issuance of a certificate of registration by this Board shall be evidence that the person named therein is entitled to

all the rights and privileges of a registered professional engineer, registered architect or registered land surveyor while the said certificate remains unrevoked or unexpired.

Each registrant hereunder shall upon registration obtain a seal of the design authorized by the Board, bearing the registrant's name and the legend "registered professional engineer", or "registered architect", or "registered land surveyor". Plans, specifications, plats and reports issued by a registrant may be stamped with said seal during the life of registrant's certificate, but it shall be unlawful for any one to stamp or seal any documents with said seal after the certificate of the registrant named thereon has expired or has been revoked unless said certificate has been renewed or reissued.

Unlawful Acts and Penalties

Section 12.—Any person who after this Act has been in effect ..... months is not legally authorized to practice professional engineering, architecture or land surveying in this State according to the provisions of this Act and shall so practice, or offer so to practice in this State, except as provided in Section 13 of this Act, and any person presenting or attempting to file as his own the certificate of registration of another, or who shall give false or forged evidence of any kind to the Board, or to any member thereof, in obtaining a certificate of registration, or who shall falsely impersonate any other practitioner, of like or different name, or who shall use or attempt to use an expired or revoked certificate of registration, shall be deemed guilty of a misdemeanor and shall for each such offense of which he is convicted be punished by a fine of not less than one hundred dollars ($100) nor more than five hundred dollars ($500), or by imprisonment for three months, or by both fine and imprisonment. However, nothing in this Act shall be construed as excluding any registered architect from the practice of professional engineering or as excluding any registered professional engineer from the practice of architecture.

[Note: (*o*), This Act not only gives prestige to the titles "Registered Professional Engineer", "Registered Architect" or "Registered Land Surveyors", but it prohibits the practice as principals of all persons not registered; (*p*) By reason of overlapping of the fields of engineering and architecture, a clear line of demarcation cannot be made between these two professions; (*q*) As this Act does not prohibit a chemical engineer from building a steel arch bridge, it appears inconsistent to prohibit an architect from building such a bridge, or a structural engineer from building a church. Ethical considerations and professional opinion must confine the scope of each person's practice to the fields in which he is a master.]

EXEMPTIONS

Section 13.—The following shall be exempted from the provisions of this Act:

1. Offering to practice in this State as a professional engineer, architect or land surveyor, by any person not a resident of and having no established place of business in this State.

[Note: (*r*), A professional card in a journal of National circulation is an "offer to practice" in any State in the Union. It would be manifestly unfair to compel a professional man to register in every State in which he may in this way, or by letter or otherwise, express his readiness to accept an engagement.]

2. Practice as a professional engineer, architect or land surveyor in this State by any person not a resident in this State and having no established place of business in this State, when this practice does not aggregate more than fifteen days in any calendar year; provided, that said person is legally qualified for such professional service in his own State or country.

[Note: (*s*), It is a distinct advantage to the people of any State to be able to call in for consultation a specialist from any other State. Such practice may be brief, and often of an emergency nature.]

3. Practice as a professional engineer, architect or land surveyor in this State by any person not a resident of and having no established place of business in this State, or any person resident in this State, but whose arrival in the State is recent; provided, however, such a person shall have filed an application for registration as a professional engineer, an architect or a land surveyor and shall have paid the fee provided for in Section 9 of this Act. Such exemption shall continue for only such reasonable time as the Board requires in which to consider and grant or deny the said application for registration.

4. Engaging in professional engineering, architecture or land surveying as an employee of a registered professional engineer, a registered architect or a registered land surveyor, or as an employee of a professional engineer, architect or land surveyor, authorized by Paragraphs 2 and 3 of this Section, provided that said practice may not include responsible charge of design or supervision.

5. Practice of professional engineering, architecture and land surveying solely as an officer or as an employee of the United States.

6. Practice of professional engineering, architecture or land surveying solely as an employee of this State or any political subdivision thereof, at the time this Act becomes effective and thereafter only until the expiration of the then existing term of office of such employee.

CORPORATIONS OR PARTNERSHIPS

Section 14.—A corporation or partnership may engage in the practice of professional engineering, architecture or land surveying in this State, provided the person or persons connected with such corporation or partnership in charge of the designing or supervision which constitutes such practice is or are registered as herein required of professional engineers, architects and land surveyors. The same exemptions shall apply to corporations and partnerships as apply to individuals under this Act.

PUBLIC WORK

Section 15.—One year after this Act goes into effect, neither the State nor any county, township, city, town or village nor other political subdivision in the State, shall engage in the construction or maintenance of any public work involving professional engineering or architecture for which the plans, specifications and estimates have not been made by, and the construction and maintenance supervised by, a registered professional engineer, or a registered architect; provided, that nothing in this section shall be held to apply to such public work wherein the contemplated expenditure for the completed project does not exceed two thousand dollars ($2 000).

LAND SURVEYING

Section 16.—Land surveying as covered by this Act refers only to surveys for the determination of areas or for the establishment or re-establishment of land boundaries and the subdivision and platting of land. Nothing in this Act shall be construed as prohibiting registered professional engineers or registered architects from making land surveys where such surveys are essential to engineering or architectural projects.

REPEAL OF CONFLICTING LEGISLATION

Section 17.—All laws or parts of laws in conflict with the provisions of this Act are hereby repealed.

Engineering Council Approves Committee's Proposed Classification of Engineers

A complete and definite classification for engineers in Federal, State, County, Municipal and Railroad service was approved by Engineering Council at its meeting on December 18th, 1919, when it adopted the classification proposed in the third progress report of its Committee on Classification and Compensation of Engineers, of which Arthur S. Tuttle, M. Am. Soc. C. E., is chairman. Eight grades are defined, five professional and three sub-professional, and the necessary qualifications are specified. A striking comparison of the results of

this latest investigation into Federal, State and Municipal service with those reported in 1917 by the committee of the American Society of Civil Engineers appointed to investigate the conditions of employment and compensation of civil engineers was pointed out in the committee report.

The extracts of this report which follow include, in addition to the classification and the above-mentioned comparison, an interesting tabulation of average salaries in Federal, State and Municipal service, with average ages of the incumbents and average salaries recommended by the engineers in charge. A schedule of salaries for engineers in city, State and National governmental employment is suggested by the Committee for discussion. The Committee asked for an appropriation of $10 000 for the purpose of continuing the investigation into present salaries and to insure publicity and progress in the effort to raise the level of engineering compensation. This is one of the items for which Engineering Council is making its appeal for funds, and the effective continuation of the work of the Committee is dependent upon the outcome of that appeal.

Findings and Conclusions of the Committee

The investigations have shown the lack of any adequate or consistent employment policy with respect to professional engineers. This is evidenced by the following conditions which are believed to be largely responsible for the unsatisfactory status of men engaged in this class of work:

1. Absence of any uniform system of grading of positions.
2. Lack of uniformity in titles of positions with respect to duties.
3. Inequalities in compensation for positions of the same grade.
4. Generally inadequate compensation for services rendered.

To the end that these conditions may be corrected and proper and equitable conditions of employment established, the following principles and practices are recommended by the Committee, though not yet acted upon by Council.

1. Positions should be classified in accordance with the type of work, and with the character of the duties to be performed and the qualifications necessary for their performance, as indicated by a system of grading.

2. Within the salary limits fixed for each grade, there should be a system of advancement through the grade based upon experience gained in the position and upon proof of increase in the proficiency of the employee in performing the duties of the grade.

3. Promotions from grade to grade should depend upon the existence of a vacancy in the higher grade and proof that the employee is qualified to fill the vacancy.

4. The determination of salary adequate to procure for and retain in engineering work a high class of employees, should take into account and properly weigh the following considerations:

(*a*) The capital invested, both in money and in time, in obtaining the requisite fundamental training.

(*b*) The amount and character of experience and the degree of personal ability required.

(*c*) The relative value of the classes of work to be performed.

(*d*) The amount paid for similar service in other lines of work.

(*e*) The amount necessary to enable the employee to maintain a standard of living commensurate with the general standards of the community for positions of similar dignity and responsibility.

5. In the interest of an adequate social policy, no position likely to be occupied by individuals of an age to assume family responsibilities should fail to pay an amount sufficient to permit the maintenance of the average family in reasonable decency and comfort.

6. In the interest of the employees as a whole and of the employer, a system should be established by which employees who fail to maintain satisfactory standards of service should be removed, transferred, demoted, or retired as may be equitable in the circumstances.

Classification of Engineering Positions in Federal, State, County, Municipal and Railroad Services

The grades proposed, which appear to be well adapted to use not only in all of the services represented but also for all other forms of engineering activities, have been divided into two classes, the Professional Service being deemed to include men who have received an engineering degree from an educational institution of recognized standing or who have obtained similar qualifications through practice of the profession and by mastering the fundamentals of engineering science, while the Sub-Professional Service includes assistants with at least a high school education, who enter upon the practice of the profession in the performance of responsible duties for which an engineering training is not essential, but who through experience and study may fit themselves for the higher grades. The classification is as follows:

PROFESSIONAL SERVICE

Grade 1.—Chief Engineer

Duties.—To act in chief administrative charge of a technical organization, or of a main division thereof; to determine the general policies of the organization under the limitations imposed by law, regulation, or other fixed requirement; to have final responsibility for the preparation of reports, cost estimates, designs, and specifications and for the

construction, maintenance, or operation of engineering works or projects; to have full charge of the collection and presentation of data for and the conduct of valuation proceedings; to conduct or direct the most comprehensive lines of engineering research.

Qualifications.—Training and experience of a character to give substantial evidence of engineering knowledge and ability or of executive capacity of highest order along lines of work similar to those involved in the position to be occupied and of at least twelve years' duration, of which at least four years shall have been spent in duties of Engineer, or their equivalent, and at least five years in responsible charge of important work or projects. Fundamental training equivalent to that represented by professional degree granted upon the completion of a standard course of engineering instruction in an educational institution of recognized standing or, in absence of such degree, at least four years of additional experience. The completion of each full year of such standard course shall be considered the equivalent of one year of such additional experience.

GRADE 2.—ENGINEER

Duties.—Under general administrative direction and within the limits of the general policies of the organization, to have responsible charge of and to initiate and determine policies for a major subdivision of an organization; to prepare for final executive action reports, cost estimates, designs, specifications, and valuation studies and data; to have immediate charge of the construction, maintenance, or operation of engineering works or projects of major importance; to conduct or direct major lines of engineering research; or to furnish for executive action expert or critical advice on engineering works, projects or policies.

Qualifications.—Active professional practice or executive charge of work for at least eight years, of a character to demonstrate a high degree of initiative and of ability in the administration, design, or construction of engineering work or projects of major importance, of which at least three years shall have been spent in duties of Senior Assistant Engineer, or their equivalent, and at least three years in responsible charge of work. Fundamental training equivalent to that represented by professional degree granted upon the completion of a standard course of engineering instruction in an educational institution of recognized standing or, in absence of such degree, at least four years of additional experience. The completion of each full year of such standard course shall be considered the equivalent of one year of such additional experience.

GRADE 3.—SENIOR ASSISTANT ENGINEER

Duties.—Under general administrative and technical direction, to be in responsible charge of an intermediate division of an organization;

to exercise independent engineering judgment and assume responsibility in studies and computations necessary for the preparation of reports, cost estimates, designs, specifications, or valuations; to have immediate charge of the construction, maintenance, or operation of important engineering works or projects; or to conduct or direct important lines of engineering research.

Qualifications.—Active professional practice or executive charge of work for at least five years, of which at least three years shall have been spent in duties of Assistant Engineer, or their equivalent, with at least one year in responsible charge of work. Fundamental training equivalent to that represented by professional degree granted upon the completion of a standard course of engineering instruction in an educational institution of recognized standing or, in absence of such degree, at least four years of additional experience. The completion of each full year of such standard course shall be considered the equivalent of one year of such additional experience.

Grade 4.—Assistant Engineer

Duties.—Under specific administrative and technical direction, to be responsible for the conduct of the work of a minor subdivision of an organization; to collect and compile data for specific items of engineering studies; to take immediate charge of field survey projects and of the design and construction of minor engineering work; to lay out and develop work from specifications and to supervise the work of a drafting or computing force; or to conduct specific tests or investigations of apparatus, material, or processes.

Qualifications.—Experience for at least two years in duties of Junior Assistant Engineer or their equivalent. Fundamental training equivalent to that represented by professional degree granted upon the completion of a standard course of engineering instruction in an educational institution of recognized standing or, in absence of such degree, at least four years of additional experience. The completion of each full year of such standard course shall be considered the equivalent of one year of such additional experience.

Grade 5.—Junior Assistant Engineer

Duties.—Under immediate supervision, to perform work involving the use of surveying, measuring, and drafting instruments; to take charge of parties on survey or construction work; to design details from sketches or specifications; to compute and compile data for reports or records; to inspect or investigate minor details of engineering work; or to perform routine tests of apparatus, material, or processes.

Qualifications.—No experience required other than that involved in securing a professional degree upon the completion of a standard course

of engineering instruction in an educational institution of recognized standing; but in absence of such degree, a high school education or its equivalent is required and at least four years' experience in the use of surveying, measuring or drafting instruments, or the computation and compilation of engineering data, together with evidence of a knowledge of the fundamentals of engineering science sufficient, with further experience, to qualify for the higher professional grades. The completion of each full year of such standard course of engineering instruction shall be considered as the equivalent of one year of experience.

SUB-PROFESSIONAL SERVICE

Grade 6.—Senior Aid, Office

Duties.—To supervise the plotting of notes and maps, and to direct the work of a drafting or computing squad.

Qualifications.—Experience for at least five years in tracing, lettering, drafting, and computing, of which at least three years shall have been spent in the duties of draftsman. Education equivalent to graduation from high school. The completion of each full year of a standard course of engineering instruction in an educational institution of recognized standing shall be considered as the equivalent of the experience otherwise required, with the provision, however, that at least one year shall have been spent in the duties of draftsman.

Grade 6.—Senior Aid, Field

Duties.—To direct work of field party on surveys or construction; to keep survey notes and engineering records; to supervise construction or repair work; to direct the work of computing surveys and estimates; to direct the work of making minor engineering computations.

Qualifications.—Experience for at least five years in the use and care of surveying instruments, of which at least three years shall have been spent in the duties of instrumentman. Education equivalent to graduation from high school. The completion of each full year of a standard course of engineering instruction in an educational institution of recognized standing shall be considered as the equivalent of the experience otherwise required, with the provision, however, that at least one year shall have been spent in the duties of instrumentman.

Grade 7.—Aid, Office

Duties.—To prepare general working drawings where design is furnished; to plot notes and prepare maps; to design simple structures; to make computations and compile data for reports and records; to check plans, surveys, and other engineering data.

Qualifications.—Experience for at least two years in tracing, lettering, drafting, and computing. Education equivalent to graduation from high school and familiarity with the use of the slide rule, and of logarithmic and other simple mathematical tables. The completion of each full year of a standard course of engineering instruction in an educational institution of recognized standing shall be considered as the equivalent of the experience otherwise required.

Grade 7.—Aid, Field

Duties.—To run surveying instruments and to adjust and care for same; to compute surveys and estimates; to make minor engineering computations; to inspect incidentally construction or repair work.

Qualifications.—Experience for at least two years in the duties of rodman. Education equivalent to graduation from high school and familiarity with the construction, operation, and care of surveying instruments. The completion of each full year of a standard course of engineering instruction in an educational institution of recognized standing shall be considered as the equivalent of the experience otherwise required.

Grade 8.—Junior Aid, Office

Duties.—To trace and letter maps and plans; to make simple drawings from sketches and data; to make minor calculations.

Qualifications.—Education equivalent to graduation from high school.

Grade 8.—Junior Aid, Field

Duties.—To run tape or leveling rod; to perform other miscellaneous subordinate duties in survey party in field or office, as directed.

Qualifications.—Education equivalent to graduation from high school.

Experience Equivalents for Post-Graduate Work

The completion of each full year of post-graduate work in the specific subject of study or investigation appropriate to a particular service or branch of service shall be considered the equivalent of one and one-half years of general experience, but such substitution shall not thus be made for more than four years of such experience or be considered as reducing the requirements in any grade of the number of years engaged in the conduct or direction of responsible work.

An examination of the schedule shows that the minimum experience requirements for the various grades may be briefly summarized as follows:

Service	Grade	Experience in Years: With Degree in Engineering	Experience in Years: Without Degree in Engineering
Sub-professional ...	8—Junior Aid.....	0	0
	7—Aid	0	2
	6—Senior Aid.....	0	5
Professional	5—Junior Assistant Engineer	0	4
	4—Assistant Engineer	2	6
	3—Senior Assistant Engineer	5	9
	2—Engineer	8	12
	1—Chief Engineer ...	12	16

Some Title Equivalents in Common Use

The following table illustrates the practicability of adapting the proposed classification to any particular grade or branch of the engineering service and in such a way as to clearly retain a description of the relative rank.

PROFESSIONAL SERVICE

1—Chief Engineer

Chief Engineer
State Engineer
City Engineer
Chief Engineer of Maintenance of Way
Deputy Chief Engineer
Deputy State Engineer
Deputy City Engineer
Director, etc.

2—Engineer

Electrical Engineer
Mechanical Engineer
Mining Engineer
Chemical Engineer
Bridge Engineer
Sanitary Engineer
Tunnel Engineer
Maintenance of Way Engineer
Signal Engineer
Highway Engineer
Division Engineer
District Engineer
Sewer Engineer
Topographical Engineer
Landscape Engineer
Hydraulic Engineer
Geodetic Engineer
Structural Engineer
Valuation Engineer
Designing Engineer, etc.

3—Senior Assistant Engineer

Senior Assistant Electrical Engineer
Senior Assistant Mechanical Engineer
Senior Assistant Mining Engineer
Senior Assistant Chemical Engineer
Senior Assistant Bridge Engineer, etc.

4—Assistant Engineer

Similar to Senior Assistant Engineer

5—Junior Assistant Engineer

Engineer Inspector, etc.

SUB-PROFESSIONAL SERVICE

6—Senior Aid

Office: Chief Draftsman
Chief Computer

Field: Chief Instrumentman
Chief Inspector

7—Aid

Office: Draftsman
Computer

Field: Instrumentman
Inspector

8—Junior Aid

Office: Junior Draftsman
Tracer

Field: Rodman
Tapeman

Striking Comparison of Results of Investigations Into Compensation

In 1913 a committee was appointed by the Board of Direction of the American Society of Civil Engineers to investigate the conditions of employment and compensation of civil engineers. This committee was headed by the late Alfred Noble, Past-President, Am. Soc. C. E., who was succeeded as chairman by Nelson P. Lewis, M. Am. Soc. C. E. In its final report, presented at the Annual Meeting of the Society held in 1917, the committee gave the results of its canvasses, comprising returns from 6 378 engineers, of whom 1 319 were non-members. The distribution among the various services of such returns as could be classified showed an average compensation as follows:

Service	Number of Classified Men	Average Compensation
States and Counties	387	$2 735
National Governments	575	2 899
Municipalities	764	2 994
Technical Schools	262	3 240
Railroads	814	3 325
Private Companies	2 198	4 240
Consulting Engineers	620	6 737
Contractors	165	7 678
	5 785	$4 032

The committee advised that the analysis of the returns showed that the pay received by members of the Society was generally about 25% above that of non-members. It also stated that an effort had been made to obtain information from Railroad, Municipal, State, and Federal Departments but that the officials in authority considered it impracticable to undertake a collection of the desired data, and in the absence of this co-operation no headway could be made. The committee also reported that from the meager information obtained it was "convinced that the compensation for engineering work compares favorably with that received by men of any other profession", and that there was need for "better trained engineers rather than of more engineers".

That a radical change of heart has since taken place on the part of responsible department heads is clearly evidenced by the fact that practically the entire Federal engineering service, except the War Department, has co-operated in the present inquiry, as have also 42% of the state officials, and 70% of the municipal officials, and that the financial status of 10 089 men in these grades has now been revealed as compared with a total of 1 726 men, in the same classes of service, who replied to the 1913-1916 inquiry. It also appears that the respondents in the case of the previous investigation were largely confined to the classes receiving maximum compensation, the average rate of present compensation shown by the new return being as follows:

Service	Number of Men	Average Compensation
Federal Government—Navy Department	594	$2 474
Federal Government—(excluding War and Navy Departments)	3 956	1 814
Federal Government (excluding War Department)	4 550	1 900
State	2 222	1 700
Municipal	3 317	1 820

In comparing these returns with those received by the previous committee, the decrease in the value of the dollar should also be borne in mind.

Results from Questionnaires

Tables 1, 2 and 3 include partial results of the analysis of Federal, State and Municipal returns from questionnaires received up to the date of the committee report, December 15th, 1919.

It is thus disclosed that the average compensation for grades representing 68% of the engineers in the Federal Service, other than the War Department, and 86% of those in State and Municipal Service, is less than is required for the support of a family

TABLE 1.—Federal Service, Summary of Present Salaries by Grades.

Grade.	General description of duties.	16 Engineering Bureaus in Civil Establishments.					4 Engineering Bureaus in Navy Department.				
		No. of persons.	Present pay per annum.			Per cent. increase of the average since July 1, 1915.	No. of persons.	Present pay per annum.			Per cent. increase of the average since July 1, 1915.
			Average.	Maximum.	Minimum.			Average.	Maximum.	Minimum.	
1	Chief administrative officer having full charge of organization including determination of policy.....	15	$5 867	$10 000	$4 500	3.0	2	$9 450	$9 900*	$9 000*	0.0
2	Chief of major subdivision in responsible charge of large unit.....	83	3 801	7 500	1 800	5.0	4	6 381	9 000*	5 200	0.0
3	Chief of intermediate subdivision in responsible charge.....	209	3 104	5 000	1 800	9.9	22	4 312	5 634	2 304	57.6
4	Chief of minor subdivision.....	846	2 222	4 500	1 020	9.0	54	3 600	4 883	2 304	58.2
5	On general duty under direction but requiring special education and training and the use of initiative and originality.....	1 353	1 719	3 000	1 000	13.3	192	2 818	3 756	1 878	52.2
6 and 7	On subordinate duty requiring special education or training but not requiring special originality.....	1 092	1 293	2 817	600	12.0	218	1 954	4 257	1 500	38.4
8	On subordinate duty but not requiring special education, training, or originality.....	169	975	1 340	480	19.3	81	1 379	2 254	1 002	37.2
..	On special duty of responsible character requiring special qualifications and initiative.....	189	1 812	7 500	1 200	3.9	21	2 717	4 382	1 628	1.3
	Total.....	3 956					594				

* Naval Officers, all others are civilian.

TABLE 2.—STATE SERVICE, ANALYSIS OF RETURNS SHOWN BY 35 QUESTIONNAIRES FROM 27 STATES.

Position.	Number of persons now in position.	AGE, YEARS.*		AVERAGE COMPENSATION PER ANNUM.*			PER CENT. INCREASE IN COMPENSATION OVER JULY 1ST, 1915.*	
		Range.	Average.	July 1st, 1915.	July 1st, 1919.	Recommended.†	Actual on July 1st, 1919	Recommended.†
PROFESSIONAL.								
Chief Engineer	31	30-70	41	3 743	4 481	7 124	20	90
Deputy Chief Engineer	19	30-51	38	3 352	3 616	4 477	8	34
Engineer	80	30-50	37	2 530	3 019	3 934	19	56
Senior Assistant Engineer	111	30-50	32	1 981	2 429	3 222	23	63
Assistant Engineer	396	27-42	33	1 657	2 140	2 758	29	66
Junior Assistant Engineer	529	21-36	27	1 130	1 595	2 100	41	86
Staff	1 166	21-70		1 590	2 070	2 730	30	72
SUB-PROFESSIONAL.								
Senior Draftsman	29	25-40	31	1 508	1 868	2 327	24	54
Draftsman	141	22-50	28	1 224	1 653	1 944	35	59
Junior Draftsman	110	20-25	22	924	1 227	1 394	33	51
Chief Instrumentman	61	24-40	27	1 297	1 611	1 915	24	48
Instrumentman	193	22-30	23	1 243	1 498	1 773	21	43
Rodman	522	18-26	20	791	1 057	1 148	34	45
Staff	1 056	18-50		995	1 290	1 470	30	48
Entire service	2 222	18-70		1 310	1 700	2 130	30	63

* Based on such returns as are complete.

† As recommended by the engineering heads replying to questionnaire.

TABLE 3.—MUNICIPAL SERVICE, ANALYSIS OF RETURNS SHOWN BY 66 QUESTIONNAIRES FROM 40 CITIES.

Position.	Number of persons now in position.	AGE—YEARS.*		AVERAGE COMPENSATION PER ANNUM.*			PER CENT. INCREASE IN COMPENSATION OVER JULY 1ST, 1915.*	
		Range.	Average.	July 1st, 1915	July 1st, 1919	Recommended.†	Actual on July 1st, 1919	Recommended.†
PROFESSIONAL.								
Consulting Engineer	8	39-70	55	5 457	6 410	8 550	18	57
Chief Engineer	64	30-64	44	5 424	5 467	7 465	1	38
Deputy Chief Engineer	19	35-60	48	4 624	4 901	6 320	6	37
Engineer	165	30-68	46	3 446	3 679	4 749	7	38
Senior Assistant Engineer	265	30-64	41	2 428	2 616	3 293	8	36
Assistant Engineer	505	27-53	40	1 902	1 999	2 613	5	37
Junior Assistant Engineer	452	25-45	34	1 415	1 548	1 812	9	28
Staff	1 478	25-70		2 230	2 370	3 020	6.5	36
SUB-PROFESSIONAL.								
Senior Draftsman	100	28-53	42	1 777	1 982	2 356	12	33
Draftsman	442	25-65	35	1 395	1 626	2 008	17	44
Junior Draftsman	118	21-48	26	1 055	1 205	1 439	14	36
Chief Instrumentman	88	28-53	40	1 454	1 700	2 162	17	49
Instrumentman	448	22-52	38	1 174	1 426	1 737	21	48
Rodman	643	17-52	32	868	1 056	1 352	22	56
Staff	1 839	17-65		1 160	1 370	1 700	18.5	47
Entire Service	3 317	17-70		1 640	1 820	2 290	11	40

* Based on such returns as are complete.

† As recommended by the engineering heads replying to questionnaire.

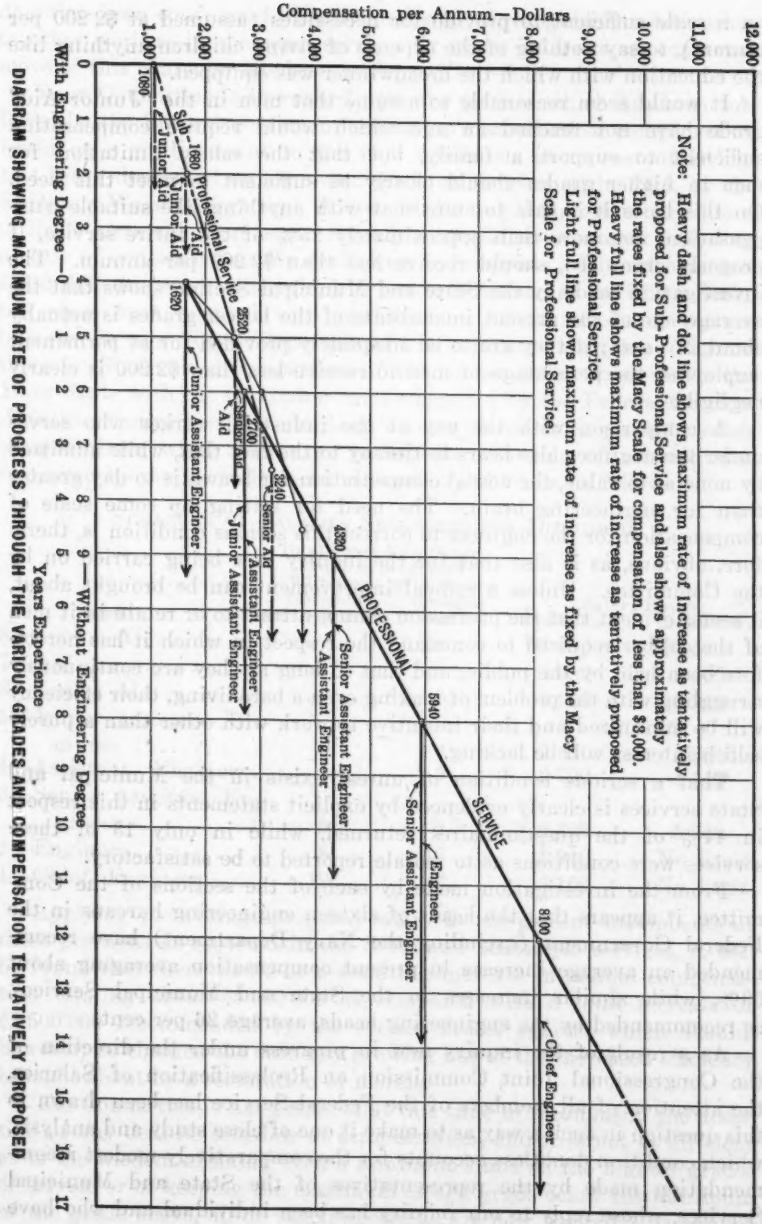

DIAGRAM SHOWING MAXIMUM RATE OF PROGRESS THROUGH THE VARIOUS GRADES AND COMPENSATION TENTATIVELY PROPOSED

on a scale sufficient to provide for necessities (assumed at $2 200 per annum), to say nothing of the expense of giving children anything like the education with which the breadwinner was equipped.

It would seem reasonable to assume that men in the "Junior Aid" grade have not reached an age which would require compensation sufficient to support a family, but that the salary limitation for men in higher grades should clearly be sufficient to meet this need. On this basis it is safe to state that with anything like suitable compensation, not more than approximately 25% of the entire service, if properly organized, should receive less than $2 200 per annum. The investigation made by the State and Municipal Section shows that the average age of the present incumbents of the lowest grades is actually about 27 years; if they are to be adequately provided for as permanent employees, the percentage of men to receive less than $2 200 is clearly negligible.

A comparison with the pay of the industrial worker who serves under the engineer also bears testimony to the fact that, while admitted by none as to value, the actual compensation for brawn is to-day greater than for engineering brain. The need for setting up some scale of compensation for the engineer to correct this serious condition is, therefore, obvious, as is also that for the inquiry now being carried on by the Committee. Unless a radical improvement can be brought about, it seems evident that the profession cannot attract to or retain in it men of the caliber required to command the respect in which it has heretofore been held by the public, and that so long as they are continuously struggling with the problem of making even a bare living, their efficiency will be minimized and their incentive to work with other than a purely selfish interest will be lacking.

That a serious condition of unrest exists in the Municipal and State services is clearly evidenced by explicit statements in this respect in 44% of the questionnaires returned, while in only 13 of these services were conditions as to morale reported to be satisfactory.

From the investigation made by each of the sections of the Committee, it appears that the heads of sixteen engineering bureaus in the Federal Government (excluding the Navy Department) have recommended an average increase in present compensation averaging about 59%, while similar increases in the State and Municipal Services, as recommended by the engineering heads, average 26 per cent.

As a result of the inquiry now in progress under the direction of the Congressional Joint Commission on Reclassification of Salaries, the attention of all members of the Federal Service has been drawn to this question in such a way as to make it one of close study and analysis, which condition doubtless accounts for the comparatively modest recommendation made by the representatives of the State and Municipal Services, whose reply to our inquiry has been individual and who have

doubtless been confronted with the necessity of recognizing relationship to other workers in the same services in whose interests no concerted move of this character has been attempted.

Your Committee is impressed with the method which has been followed by the Federal Section in setting up a standard of compensation based on a readjustment to the new conditions as to cost of living, this being dependent on an award made on October 24th, 1918, by the Shipping Wage Adjustment Board, which was designed to provide a uniform national wage scale for all shipbuilding workers, including a scale of compensation for draftsmen and copyists. It is also understood that this wage scale, which is generally known as the Macy Scale, has since been adapted with modifications to the needs of certain bureaus in the Navy Department. In the accompanying diagram there is illustrated a comparison of the compensation fixed under the Macy Scale with the maximum rates suggested by the Federal Section. A further comparison has also been made with scales proposed by other organizations, which seems to justify the schedule of salaries now suggested by the Committee for discussion, which is as follows:

SCHEDULE OF SALARIES SUGGESTED FOR DISCUSSION

Grade	Total Years Experience Required to Qualify: With Professional Degree	Total Years Experience Required to Qualify: Without Professional Degree	Salary Range: Minimum	Salary Range: Maximum
8—Junior Aid.....	....	0	$1 080	$1 560
7—Aid.....	....	2	1 680	2 400
6—Senior Aid.....	....	5	2 520	3 240
5—Junior Assistant Engineer	0	4	1 620	2 580
4—Assistant Engineer.	2	6	2 700	4 140
3—Senior Assistant Engineer	5	9	4 320	5 760
2—Engineer	8	12	5 940	No limit
1—Chief Engineer.....	12	16	8 100	No limit

Applying the average proposed salary to the present incumbents of these positions as reported in the State and Municipal services, it will be found that there would be a resulting increase in annual compensation totaling about $5 500 000 as compared with a total increase of $2 500 000 recommended by the service heads, against which should, however, be charged the economy growing out of the increased efficiency brought about by a restoration of morale.

The Committee is not prepared at this time to recommend the adoption of any definite schedule of compensation, and it is not at all clear as to the wisdom of fixing even a minimum limit on the highest grades of service or of keeping the maximum of one grade below the minimum of the grade above, all of which questions are now receiving its serious consideration, as is also the question concerning the provision to be

made for advancing within the limits of a grade, for which a plan is suggested by the Federal Section. Under this plan it is proposed at yearly intervals, through ratings determined by a Personnel Board, to provide for awarding an increase in compensation to three-fourths of the men in a grade receiving less than the maximum compensation of the grade, who through fitness and industry have shown themselves to be of increased value to the service. Those in the highest third of this preferred list would each receive the maximum rate of increase, which under the proposed scale would be $480, while each of the next two-thirds would receive an increase of $240, the latter figure corresponding with what would then be the average increase for all of the men in the grade.

It would seem to the Committee that, pending the completion of the investigation, the scale of compensation herein presented and the plan for promotion within a grade is adapted to general use in all branches of engineering service. The Committee believes, however, that a general discussion of this question is desirable.

The chairmen of the sections of the Committee are as follows: State and Municipal Section, Arthur S. Tuttle, New York City; Railroad Section, Francis Lee Stuart, New York City; Federal Government Section, John C. Hoyt, Washington, D. C.—all members of the Society. The other members of the Committee are: Charles Whiting Baker, New York City; M. O. Leighton, M. Am. Soc. C. E., Washington, D. C.; Frank H. Clark, New York City; Bion J. Arnold, M. Am. Soc. C. E., Chicago; M. M. O'Shaughnessy, M. Am. Soc. C. E., San Francisco; F. W. Cappelen, M. Am. Soc. C. E., Minneapolis; J. S. Conway, M. Am. Soc. C. E., Washington, D. C., and O. C. Merrill, M. Am. Soc. C. E., Washington, D. C.

Approval Given to Principles Adopted by State Reconstruction Commission

At its meeting on December 18th, 1919, Engineering Council, on recommendation of its Advisory Committee to the Reconstruction Commission of the State of New York, approved the principles of the Report of that Commission reducing 187 offices, boards, and commissions in the State to 20 departments, decreasing the number of elected executive officers to three, Governor, Lieutenant-Governor, and Controller, and proposing a businesslike budget system. The Secretary was directed to forward a notice of the approval to the Reconstruction Commission.

National Department of Public Works Convention

Alfred D. Flinn, M. Am. Soc. C. E., and Secretary of Engineering Council, has been appointed as delegate to represent the Society at the Convention of the National Department of Public Works Association (formerly the Engineers', Architects' and Constructors' Conference

on National Public Works) on January 13th-14th, 1920, at Washington, D. C. This convention was called to intensify the interest in the movement to establish a National Department of Public Works initiated at the Conference in Chicago in April, 1919, to broaden the scope of the organization, to discuss procedure and to adapt future activities to the developments that have taken place since the former Conference. Provision has been made for a general experience meeting on campaign methods and problems and the following special addresses are scheduled: "Practical Results to Be Achieved by a National Department of Public Works", by Representative Frank C. Reavis; "Economies Secured by Standardization of Construction", by Gen. R. C. Marshall, Jr., M. Am. Soc. C. E., Chief of the Construction Division, U. S. Army; "What a Department of Public Works Has Done for Illinois", by Governor Frank O. Lowden.

President Issues Order Constituting Board of Surveys and Maps

As a result of the conference of representatives of the Federal map-making organizations held at Washington, D. C., in September, 1919, following a letter addressed to the President by Engineering Council on July 1st, 1919, requesting such a conference, the President, through the Secretary of War, has issued the following executive order establishing a Federal Board of Surveys and Maps:

"In order to co-ordinate the activities of the various map-making agencies of the executive departments of the Government, to standardize results, and to avoid unnecessary duplication of work, I hereby constitute a Board of Surveys and Maps, to be composed of one representative of each of the following organizations:

1. Corps of Engineers, U. S. Army.
2. U. S. Coast and Geodetic Survey, Department of Commerce.
3. U. S. Geological Survey, Department of Interior.
4. General Land Office, Department of Interior.
5. Topography Branch, Post Office Department.
6. Bureau of Soils, Department of Agriculture.
7. U. S. Reclamation Service, Department of Interior.
8. Bureau of Public Roads, Department of Agriculture.
9. Bureau of Indian Affairs, Department of Interior.
10. Mississippi River Commission, War Department.
11. U. S. Lake Survey, War Department.
12. International (Canadian) Boundary Commission, Department of State.
13. Forest Service, Department of Agriculture.
14. U. S. Hydrographic Office, Navy Department.

"The individual members of this Board shall be appointed by the Chiefs of the various organizations named and shall serve without additional compensation.

"The Board is directed to make recommendations to the several Departments or to the President for the purpose of co-ordinating all map-making and surveying activities of the Government and to settle

all questions at issue between Executive Departments relating to Surveys and Maps in so far as their decisions do not conflict with existing laws.

"This Board shall perfect a permanent organization and shall hold meetings at stated intervals, to which representatives of the map-using public shall be invited for the purpose of conference and advice.

"This Board shall establish a central information office in the U. S. Geological Survey for the purpose of collecting, classifying and furnishing to the public information concerning all map and survey data available in the several Government Departments and from other sources.

"All Government Departments will make full use of the above board as an advisory body and will furnish all available information and data called for by the Board.

"So much of the Executive Order of August 10, 1906, as grants additional advisory powers to the United States Geographic Board is hereby rescinded and these additional powers are transferred to the Board of Surveys and Maps."

Co-operation with American Institute of Architects

As a result of the following telegram signed by Mr. E. J. Russell, of St. Louis, Mo., dated December 17th, 1919:

"On behalf of the American Institute of Architects you are requested to appoint a Committee of three to co-operate with a similar Committee from the Institute for the purpose of co-operating on matters of mutual interest and benefit. Our Committee has been appointed and is ready to work at your convenience."

it was voted at the December meeting of Engineering Council:

"That this invitation be cordially accepted and that a committee of three be appointed by the Chair to co-operate with the American Institute of Architects."

Proposed Budget for 1920.

On recommendation of the Executive and Finance Committees, in joint meeting, December 1st, 1919, the following budget to carry out the work planned by Engineering Council for the year 1920 was adopted:

Expected Income		
Founder Societies	$12 000	
Other member societies	3 000	
Other sources	30 000	$45 000

Proposed Expenditures		
New York office	$12 000	
Washington office	12 000	
Committee on Classification and Compensation of Engineers	10 000	
Committees	5 000	
Contingencies	6 000	$45 000

It was voted "That Council's budget for the coming year be not less than $45 000 and that every possible effort be made to raise funds of that amount"; and, "that the Secretary be instructed to control expenditures from time to time in accordance with the tangible income."

Result of Appeal for Funds

As a temporary expedient, Engineering Council recently mailed to 50 000 engineers an appeal for funds to carry on its work, an extraordinary measure necessitated by present financial conditions resulting from the war. Engineers are expecting much of Council and commending the work which it has done. In order, however, that Council may continue its work for professional welfare and civic service, not less than $45 000 are needed for 1920. Of this amount, $30 000, at least, must come from general contributions. Up to January 7th, 1920, a total of 701 contributions have been received, amounting to $4 914. They range from $1 to $100 each, and average $7, and have come from all parts of the country with practically uniform distribution of the contributors over the various sections.

Military Affairs Committee

Engineering Council, after careful study, has appointed a Committee on Military Affairs to consider the relationships which can and should exist between the engineering and scientific technical men of the country and the country's military establishment, together with the best organization of the military establishment to utilize the country's resources in technically trained men, both within and without the military and naval services. The members of the Committee are:

Civilians Who have not been in Uniformed Service:

Harold W. Buck, Past-President, A. I. E. E.
Paul G. Brown, M. Am. Soc. C. E.
George Gibbs, Past-President, Am. Inst. of Cons. Engrs., M. Am. Soc. C. E., A. S. M. E., A. I. E. E.
T. Spencer Miller, M. Am. Soc. C. E., A. I. M. E., A. S. M. E.
Leonard Waldo, A. I. M. E., A. S. M. E., A. I. E. E.

Men Who have been in Uniformed Service:

Roger D. Black, M. Am. Soc. C. E.
Fred J. Miller, President, A. S. M. E.
William Barclay Parsons, M. Am. Soc. C. E.
F. A. Snyder, M. Am. Soc. C. E.
George D. Snyder, M. Am. Soc. C. E.

The Executive Committee of Engineering Council selected Col. William Barclay Parsons as Chairman of the Military Affairs Committee, and the Committee elected Col. George D. Snyder, Secretary. The Secretary's address is care of Jacobs and Davies, 30 Church St., New York City.

Committees to Consider Types of Government Contracts and Payment for Estimating

For consideration of types for Government contracts, Engineering Council has appointed the following Committee: Arthur P. Davis, Chairman, D. K. Boyd, Harold W. Buck, J. A. Capp, Peter Junkersfeld, W. M. McFarland, Admiral H. H. Rousseau, and Col. Clarence O. Sherrill. Some Government departments have given assurance of their interest and co-operation in the work of this Committee.

On the subject of "Payment for Estimating", Engineering Council has appointed three conferees: T. L. Condron, Ralph Modjeski, and S. G. Neiler, who are collaborating with an equal number of representatives each of the American Institute of Architects and the Associated General Contractors of America.

Visit of Representative of National Association of Italian Engineers

Capt. Paul Tuccimei, a member of the Executive Board of the Associazione Nazionale degli Ingegneri Italiani and a member of the Italian Mission to the International Trade Conference in the United States, visiting the office of Engineering Council, discussed the sociological and industrial problems in Italy, and those of engineering organization. His statements might have been those of an American about conditions in the United States. The same subordination of technical men in Italy to politicians, military men and lawyers has resulted in the same economic and governmental and military inefficiency, and in unnecessarily large loss of life and money, in peace and in war. The same multiplicity of societies, but lack of real organization, there as here, made the influence of the technical men almost negligible in comparison with organized labor and entrenched law and politics. There are 37 engineering societies in Italy, all provincial or local.

Capt. Tuccimei served four years in the Italian Artillery, on the Austrian Front. Many other engineers were in the army. As they met from time to time and discussed their situation, they perceived that their weakness in peace and in war as an element of the nation which should have been strongly influential because of their knowledge, was due to lack of an organization which could speak with the power of numbers and unity of purpose. This weakness not only caused loss to the nation, but resulted in low appreciation of the technical man's value to society and consequent inadequate compensation for his services.

Out of the informal conferences of civilian engineers in the army grew a determination to combine all the engineers and architects into one great National association. After due preparation, the scheme was launched in April, 1919, throughout the country by a speaking campaign before the societies of engineers in the principal cities and organization was completed in May. Definite proposals were made, also, to the

existing provincial and local societies. By September, the Associazione Nazionale degli Ingegneri Italiani had 4 000 members; it expects to have in its ranks practically all of the 10 000 professional engineers and architects in Italy. Only graduates of universities are eligible to membership. The Association's aims are: Larger and better service to the Nation and to the community; greater influence for technical men; more adequate compensation for their services, and the direction of technical projects by technical men as employers and not, as heretofore, as employees, especially for after-war reconstruction work.

Federation of existing societies was attempted, but found impracticable because of the traditions, pride of existence and rivalries which they had accumulated in their thirty to fifty years, or more, of life. It is expected that the old societies will all become parts of the new Association by merging their membership and accepting the constitution and by-laws of the Association, of which they will be sections.

Engineers in the 1920 United States Census

As a result of Engineering Council's request to the Director of the Census, the National Service Committee has been successful in effecting a reclassification of engineers so that all technical engineers will be listed as such, separately and distinctly from the non-technical engineers. Thus, the next census will bring an enumeration of all technical engineers together as one unit under the main headings of Civil, Mechanical, Electrical and Mining. Architects will also be enumerated separately.

The Steel Basing Point

As a result of further hearings before the Federal Trade Commission, it has been conceded that there will be no abolition of the long established practice of using Pittsburgh as a steel basing point. The interests that favor a single price basing point, notably the Western Association of Rolled Steel Consumers, base their claim on the allegation that the practice of using Pittsburgh is in violation of the Clayton Act. This group has attempted to show that they pay a fictitious rate on fictitious transportation from Pittsburgh on steel produced through the Western District and for this reason they claim that they are unable to compete in the Eastern market, whereas the Eastern fabricators can place their products in the Chicago market on an even competitive basis. They declare that the public was taxed $30 000 000 a year through increased prices of manufactured steel.

Counsel for the Steel Corporation showed that since Chicago producers can only supply one-half of the Chicago demand, the Pittsburgh price must dominate since it supplies the other half. There would be

no advantage to the Chicago producers in selling at less than the Pittsburgh price when they could not profit by any extra demand so created. They naturally sell at the market price, which is the Pittsburgh level. When producers can supply all the requirements of their own territory, the Pittsburgh basing point will cease as a result of natural laws. Other important steel producers have given testimony substantiating these claims.

Highway Legislation

The original bill proposing to create a National highway system controlled by a Federal Highway Commission, which was proposed by Senator Townsend, has been practically abandoned because of the opposition which has developed. It is now believed that any plan for National highways constructed directly by the Federal Government will be unpopular with the States because only a limited portion of the State will be benefited directly by such highways. Further, the Government with its road building activities would be in competition with the States and the counties. It is believed that it will be easier for the Federal Government to hold the States up to a standard rather than to attempt to maintain the standard through its own work.

Another highway bill which proposes a National Highway Department and Highway Commission has been introduced into the House, which aims to do away with the defects which have become apparent in the Townsend bill. It will bring the control of highway work more closely under the control of the States, at the same time giving enough Federal supervision to insure co-ordination and standardization in the work. The States are to be divided into ten regional areas with corresponding Regional Congresses having direct control of the work in their region, but under the general direction of the National Highway Commission.

For the purpose of carrying out the provisions of this new act and as an initial appropriation for the creation of a National Department of Highways, the new bill proposes to appropriate $10 000 000. The Secretary of Highways would receive $12 000 per year, and each National Highway Commissioner would receive $6 000 per year.

Estimates for Public Works—Fiscal Year 1920

The Secretary of the Treasury has approved and forwarded to Congress estimates for next year which total the unusually large sum of $283 921 810. The appropriations for public works during the fiscal year 1920 total $93 872 092. The estimates for work of particular interest to engineers and constructors are as follows:

Construction of Government buildings, including purchase of sites, $1 332 775; marine hospitals and quarantine stations, $5 204 621; forti-

fications, $117 793 330; military posts, $14 225 251; rivers and harbors, $53 659 265; Navy yards and stations, $20 606 000; Panama Canal construction and maintenance, $18 245 391; depots for coal and other fuels, $2 335 000; Reclamation Service, $20 134 000; $725 000 special appropriation for a fuel inspection system; $1 865 880 for the Bureau of Mines; $2 592 920 for the Geological Survey, and $3 000 000 (approximately) for the Bureau of Standards.

Continuance of Construction Division

At the time hearings were being held on the subject of Army reorganization, the Chairman of the National Service Committee of Engineering Council addressed the Military Affairs Committee of both Houses and Gen. Pershing, directing their attention to the splendid record of the Construction Division, and urged that this Division be continued in substantially its present form so that it will be enabled to carry on the work that has been started, in the same efficient manner. Replies from the Chairmen of both Committees indicated that they realized the value of the Construction Division under its present organization and showed that they personally were in favor of maintaining this Division intact.

There is still a good chance that the Military Affairs Committees of both Houses will recognize it as a separate corps. The officials of the Construction Division and practically all civil engineers who have had work with the Division in the various parts of the country desire that such action be taken. It is the general belief that the efficiency of the Construction Division will be impaired if it is returned to the Quartermaster General's Department or made a part of the Engineer Corps.

The points made against incorporating the Construction Division in the Engineer Corps or returning it to the Quartermaster's Department were that engineers are the first to be sent to the front, whereas the duties of the Construction Division are at training camps, supply depots, etc., some distance from the actual fighting. Thus, it would be far removed from its administration, beside which such men do not have the kind of technical training that is required in the construction work. If the Construction Division was returned to the Quartermaster Department it would soon swallow up that department, especially if the proposed construction programme of the Army is carried out.

The bill proposed by the General Staff is dead from a legislative standpoint, as is the Dent bill and other drafts made along the lines of the General Staff bill. The Military Affairs Committees are drafting entirely new Army reorganization bills which it is expected will be introduced in the respective Houses shortly.

The Movement for a Mental Hygiene of Industry

In February, 1919, Engineering Foundation undertook to support a limited study by Dr. E. E. Southard, Director, Massachusetts State Psychiatric Institute, of mentally abnormal persons in industry. The Massachusetts Department of Mental Diseases, The National Committee for Mental Hygiene, and the Permanent Charity Fund, of Boston, have co-operated. The preliminary paper of a series, an introductory statement on the nature of this study, prepared by Dr. Southard, has been published substantially in full in the February issue of *Industrial Management* and in the January issue of *Mental Hygiene* under the title "The Movement for a Mental Hygiene of Industry". Engineering Foundation has reserved the rights of publication.

This new development in the analysis of certain definite modern tendencies in industrial relations is treated by Dr. Southard from the basis of the achievements of psychologists, physicians and social workers during the War. He defines "mental hygiene" as a term coming into general use to cover the expert activities of pyschiatrists (medical men interested in problems of mental disease, including the mildest forms of temperamental deviation) and gives, as the keynote of this systematic attack on industrial personnel problems by means of mental hygienic data and methods, the pooling and co-operative combination of expert engineering interest with expert medical, psychological and sociological interests. He asks why industrial managers should not seek the aid of (*a*) those who can measure mental capacities, (*b*) those who are specialists in temperament, and (*c*) others capable of helping to trace out the actual situation, for example, in labor turnover.

The other papers of the series are to be entitled, as follows: "Specifications for Clinics to Demonstrate to Employment Managers Certain Useful Points in Character and Temperament"; "Analysis of a Further Series of Psychopathic Employees, with an Account of Success and Failure in Their Placement"; "Bibliography with Comment"; "The Utility in Industrial Problems of the Modern Specialist in Grievances", and "A Comparison of Tendencies to Violence Shown in Industry with Like Tendencies in the Insane".

Engineering Foundation Appeals for Funds

A letter from W. F. M. Goss, Chairman of The Engineering Foundation, calls attention to the Progress Report of the Foundation Board, and appeals to the Founder Societies to help increase the endowment fund of $300 000, donated by Ambrose Swasey, to at least $500 000. He believes the Foundation should look forward to a growth in its endowment at a rate of not less than a half million dollars a year for the next five years, and asks whether there are not other engineers, like Mr. Swasey, who will find satisfaction in having a part in the upbuild-

ing of a permanent organization for the advancement of the profession of engineering and the good of mankind. He outlines briefly the Foundation's work, as follows:

"It contributed, for a considerable period, its full strength to the support of the National Research Council, an organization then in its formative period and without support, and which now commands the assistance of many different agencies and functions in many different fields.

"It collaborated with the National Research Council in working out a basis for future co-operation which now seems to assure the harmonious development of both organizations.

"When the nation was at war, it conducted tests in co-operation with the Committee on Submarine Detection, to determine the value of a veil of spray in reducing the visibility of ships at sea, with results which have been formally reported.

"As represented by Messrs. Woodard, Porter and Townley, it conducted a careful inquiry concerning the practicability and advisability of establishing a hydraulic station for testing large water wheels.

"It formulated a proposal to the several Founder Societies to undertake along the broadest possible lines, with the aid of highly qualified experts and in co-operation with all agencies willing to help, a study of engineering society organization for the purpose of developing a possible procedure or series of procedures of such evident merit that they would appeal to those who are likely to be most interested.

"It is now conducting under the direction of Professors Guido Marx and Lawrence E. Carter, an investigation concerning the wear of gears.

"It is now conducting under the general direction of Dr. Michael I. Pupin, experiments covering methods proposed for the secret directive control of wireless communication.

"It is now conducting in co-operation with Mr. Clemens Herschel, experiments covering certain unsolved factors in the behavior of water and other liquids in passing over weirs.

"It is now conducting in co-operation with Dr. E. E. Southard, a preliminary investigation as to the part played by mental abnormalities in industry.

"It is now assisting the Division of Engineering, National Research Council, in a series of preliminary investigations concerning the desirability of researches along several different specific fields of activity.

"It is now co-operating with the University of Illinois, as represented by Professor H. F. Moore, in advancing with the utmost rapidity, the important researches which he has in hand on the Fatigue Phenomena of Metals."

Agreement for Research in Fatigue of Metals

In order to carry out the programme for a co-operative investigation of the fatigue phenomena of metals,* articles of agreement have been entered into between the University of Illinois, the Engineering Foundation, and the National Research Council. The agreement is executed for a period of two years beginning November 1st, 1919, and provides that the University will delegate Prof. H. F. Moore, or some other

* *Proceedings*, Am. Soc. C. E., Oct.–Nov.–Dec., 1919, p. 956.

competent person should his connection with the University cease, to supervise and direct all experimental work and the computation and reduction of all results obtained, together with the placing of these data into form for presentation.

To finance this work, Engineering Foundation paid $9 000 to the University on November 15th, 1919, and is to pay $3 000 quarterly up to and including August 15th, 1921. The necessary special apparatus may be purchased and shall remain the property of Engineering Foundation until disposed of by its direction. The Committee on the Fatigue Phenomena of Metals of the National Research Council shall constitute the Advisory Committee in developing the test programme and the conduct of the investigation, although the actual conduct of the tests shall be under the control of the Engineering Experiment Station of the University, and the latter is to have the right to publish the results as a bulletin of the Station. In addition, the Station is to prepare a brief, comprehensive statement regarding the investigation, suitable for publication in the journals of the Engineering Societies.

Provision is made to allow publication by the Engineering Foundation and the National Research Council in case the University is unwilling to proceed with the publication of the results within a reasonable time. The manuscript is to be approved by the Advisory Committee, the Engineering Foundation, and the National Research Council, except that the University can proceed with the publication if this approval is not given within a reasonable time. Research assistants, etc., are to be employed by the University and paid out of the fund provided by the Foundation, payments by the latter to be deferred, however, if progress and disbursements are not as rapid as the quarterly rate of payment agreed upon.

Engineering Societies Employment Bureau

A statistical statement of the activities of the Engineering Societies Employment Bureau, of which Walter V. Brown is Manager, shows that during the year from December 1st, 1918, to December 1st, 1919, a total of 5 377 men were registered and of these 1 256 are reported as placed. The total number of positions registered as available was 2 495, and 502 are reported as open, the report being dated November, 1919. The distribution among the four Founder Societies is given as follows:

Society	Registered	Placed
Civil Engineers	507	104
Mining Engineers	279	60
Mechanical Engineers	975	265
Electrical Engineers	521	105
Total Members	2 282	534
Non-members	3 095	722
Grand Total	5 377	1 256

It is pointed out that the figures given for men placed are based upon the best obtainable data at hand, are approximate only, and are much lower than they should be because of the great difficulty of getting reports of placements.

The governing bodies of the four Founder Societies have directed that the appropriation for the year 1920 for employment activities be separated from the appropriation for Engineering Council, and that the employment activities be conducted directly by the Societies under the supervision of their respective secretaries, in accordance with the practice in force for many years prior to the war.

Engineering Journals Adopt Standard Magazine Size

With the issues of January, 1920, two of the Founder Societies—the American Institute of Electrical Engineers and the American Institute of Mining and Metallurgical Engineers—have enlarged their monthly publications to standard 9 by 12-in. magazine size and changed their policy in presenting a record of Society activities. All the Founder Societies except the Civil Engineers have now adopted the common standard, and are accepting advertising as a substantial addition to the income to help defray the cost of publication.

In *Mining and Metallurgy,* the technical papers are inserted as pamphlets 6 by 9 in. in size, numbered as sections to comply with the postal regulations. These papers can then easily be filed for reference or for binding with other material on any given subject. The new form gives opportunity properly to use and display the many valuable papers presented at the meetings of Local Sections and not becoming part of the *Transactions.* Abstracts from important papers in current periodicals, domestic and foreign, are made a feature of the publication, which in its first number has set a high standard for the future.

The *Journal* of the American Institute of Electrical Engineers, formerly its *Proceedings,* in its new size and dress has also set a high standard, and is one result of the work of the Institute's Committee on Development, based upon the response of the membership to the Committee's request for suggestions. The new *Journal* will include not only the material similar to that heretofore published and consisting principally of engineering and theoretical papers and discussions, but additional matter relating to progress in the art of electrical engineering selected with the object of publishing in each issue something that will appeal to each reader.

Many other professional Societies have adopted substantially the same size, including the Institution of Electrical Engineers of Great Britain, the Engineering Institute of Canada, the American Chemical Society, and the Society of Automotive Engineers, as well as the American Society of Mechanical Engineers.

Engineers' Club of Lansing, Mich.

Following a meeting called on October 29th, 1919, the engineers of Lansing, Mich., formed the Engineers' Club of Lansing, which has met five times during the Fall, with an average attendance of 75. The membership is not limited to members of the Founder Societies, but embraces all grades of engineers. It is hoped that the organization will develop along the lines recommended by the Committee on Development of the Society. The following officers were elected for the coming year:

President, O. E. Eckert, Assoc. M. Am. Soc. C. E., City Engineer, Lansing; Vice-President, C. E. Bement, Vice-President and General Manager, Novo Engine Company, Lansing; Secretary-Treasurer, F. L. Radford, Assistant Engineer, Reo Motor Car Company, Lansing; Directors, E. D. Rich, M. Am. Soc. C. E., State Sanitary Engineer, and G. W. Bissell, Dean of Engineering, Michigan Agricultural College, Lansing.

American Engineering Standards Committee

At the annual meeting of the American Engineering Standards Committee, A. A. Stevenson was elected Chairman and G. C. Stone, Vice-Chairman for the coming year. Dr. P. G. Agnew, formerly Assistant Physicist of the United States Bureau of Standards, accepted the position of Secretary, his duties to begin on December 15th, 1919. The resignation of the former Chairman, Comfort A. Adams was accepted "with many regrets and with heartfelt thanks for the excellent way in which he had guided the affairs of the Committee since its inception". The further hope was expressed that his new duties with The National Research Council as Chairman of the Division of Engineering would permit continued co-operation in the future.

Following the reading of a letter from the Association of American Steel Manufacturers requesting the appointment of sponsor bodies for the standardization of rolled structural sections, the Committee voted: "that the American Society of Civil Engineers, The Association of American Steel Manufacturers, the American Railway Association and the Society of Naval Architects and Marine Engineers be invited to accept sponsorship for the formulation of standards of rolled structural sections."

EUROPEAN NOTES

The following notes relative to reconstruction, etc., in Belgium and France, and industrial progress, etc., in Great Britain and elsewhere, have been contributed by W. E. Woolley, Assoc. M. Am. Soc. C. E., of London, England, who is also a Corresponding Member of the Association of Liége (Belgium) Architects.

Additional Organizations for Engineers and Architects, England

An additional society for engineers, called the "Society of Technical Engineers", was founded during the Late War, in London. All technically trained engineers, whether civil, mechanical, electrical, municipal, etc. are eligible for membership. The main object of the society appears to be to protect the interests of the technically trained professional engineer.

Two additional architectural organizations have lately sprung into existence, one of them, the "Official Architects' Association", held its first general meeting on December 1st, 1919, with Mr. W. E. Riley, late Superintending Architect, London County Council, as its first president. The Association is formed to serve a longfelt want by architects engaged in official positions. The second organization, "The Architects' and Surveyors' Assistants' Professional Union", at a meetting held on December 5th, 1919, adopted its constitution and rules, as prepared by the London Executive Committee. It is, in reality, a welfare union of assistants.

Steel Houses

Mr. Bonar Law recently stated that the British Government was considering the practicability of the erection of steel houses, and that experiments of this nature are to be carried out.

The Tunnel Under the British Channel

Sir Arthur Fell declared to the Aldwych Club, that the War Department is favorable to the construction of the tunnel under the Channel, although it does not wish to declare itself to Parliament.

He foresees the daily departure of an express from Charing Cross (London) to Bagdad, about fifteen years hence.

Exchange of Students

It has been announced in *La Metropole,* Antwerp, that there is a proposal for an exchange between American and Belgian students, the former coming to make their studies in Belgium, the latter to enter the Universities of Princeton, Harvard, Johns Hopkins, Stanford, etc. This has been done through the initiative of H. C. Hoover, M. Am. Soc. C. E., who has formed in the United States a commission to devote its attention to these exchanges. A committee has been formed likewise in Brussels, under the presidency of M. Franqui, Secretary of State.

About 200 American students have asked to come to Belgium. A call will be sent to the Belgian Universities for those who would wish to complete their studies in America.

Reconstruction in the Devastated Regions

To the list of community stores finally established should be added those of Avelghem, Surice, Nieuport, and Westende. Many other stores will be established, notably in Dixmude and in the south of the Province of Luxembourg.

The purchases of wood from the Service of Recuperation are proceeding. These materials will be given to the Office of Devastated Regions at an average low price of 150 francs per cu. m. taken from the timber yard; 140 000 cu. m. are already acquired and it is probable that this quantity may be increased to 200 000 cu. m. In addition to the wood, the Service of Recuperation has ceded a large quantity of iron of all kinds at the price of about 350 francs per ton. The community stores can, from the present time, fix the quantities of the materials which they wish to recover.

The Office of Devastated Regions is assured also the supply of at least 8 000 000 tiles at much lower prices than those on the market.

French Society of Civil Engineers

At a meeting of French engineers resident in England, held on November 24th, 1919, at the Royal Society of Arts, Adelphi Street, London, a British Section of the "Societe des Ingenieurs Civils de France" was inaugurated. This promises to be a great success. Representatives of nearly all the British Engineering Societies, and other Scientific Societies were present. A sessional programme has been drawn up, and it is likely that the proceedings will be bi-lingual. C. H. Wordingham, C. B. E., M. Inst. C. E., etc., is Honorary President, and T. J. Gueritte, President.

BRIEF NOTES

As a result of the recommendations of the Committee on Development of the American Institute of Electrical Engineers and a petition presented by over 100 New York members to its Board of Directors, a special meeting was called on December 10th, 1919, and a New York Section of the Institute was organized. By-laws similar to those of the other thirty-four Sections of the Institute were adopted.

In view of the great part the Universities of the United States and Great Britain are taking, and must increasingly continue to take, in the problems of reconstruction, the following passage from "Joan and Peter", by H. G. Wells, is interesting: "Instead of the University *passant regardant,* we want the University *militant.* We want Universities all round and about the world, associated, working to a common end, drawing together all the best minds and the finest wills, a myriad of multi-colored threads, into one common web of a world."

The *Wall Street Journal* announces that the automobile output in France in 1920 will reach 200 000 cars, compared with 30 000 in 1914, exclusive of commercial trucks, and states that the supply cannot overtake the demand even at the present rate of production and after absorption of 150 000 American Army cars.

Correspondence from London states that Great Britain has realized $555 000 000 from the sale of surplus stores and property since the armistice.

The Post Office Department states that all load-carrying airplane records were broken on December 2d, 1919, when a twin-motor De Haviland-4 plane, devised by and manufactured for the Department, covered the distance between the air mail field at Washington and that at Belmont Park, New York, a distance of 218 miles, in 1 hour, 34 min., with a mail load of nearly 30 000 letters weighing 630 lb.

It is announced from London that British salaried professional men are forming a federation designed to insure them the increased income and other benefits which other workers have gained through trade unions. Industrial workers have received wage increases amounting to 130% or 140% during the war, while the cost of living has been increased 128%, according to organizers of the Professional Workers' Federation.

The Secretary of War directs that the Engineer Corps shall be responsible for the preparation and production of aerial route maps and will be guided in such work by the technical requirements of the Air Service. The Air Service is responsible for securing and furnishing such aerial data as may be needed, and the two services are to confer in working out principles and methods of producing aerial route maps.

At a hearing by the Joint Congressional Commission on Reclassification of Salaries, a committee representing Federal employees disclosed that the "turnover" in personnel among the scientific and technical workers of the Government amounted in some offices to 100% a year. More than 6 000 technical and scientific workers in the Government service at Washington were represented by the Committee.

The Director of Sales of the U. S. War Department, carrying out the desire of the Government to assist in the rehabilitation of French industries, especially those located in devastated regions of France, has entered into contract with the French Republic, under the terms of which the French Government is permitted to purchase $25 000 000 worth of machine tools from surplus stocks of such tools held by the War Department in the United States. The French Government is to pay for such machine tools as it may purchase in ten-year 5% bonds of the French Republic which, at maturity, are payable in dollars at Washington in the gold coin of the United States.

The U. S. Geological Survey states that several factors have combined to put added emphasis on the country's need of an adequate large-scale map of its whole territory. With nearly 60% of the area of the country totally unmapped, and with the Geological Survey, the largest mapping organization in the country, surveying only about 40% of the area in 40 years, the logical demand is for more speed. If these maps are to serve their full purpose in promoting national development, the whole country should be mapped within the next decade. The estimated cost of this mapping programme is $40 000 000, including costs of revising the older surveys.

The Joint Congressional Commission on Reclassification of Salaries announced on January 5th, 1920, that the permanent tribunal to adjust wages and working conditions of Government employees in Washington will be the Civil Service Commission. It was also stated that it will recommend that the Commission be enlarged and that the reclassification system be extended to include the 500 000 Government employees.

Fire threatened to destroy the New York Engineers' Club on the morning of December 12th, 1919. The 350 members and guests sleeping in the building were awakened and assembled on the lower floors. Although the fire was confined to the three upper floors, smoke and water caused considerable damage.

A dinner in honor of Charles Eugene Schneider, of France, was given by the Mining and Metallurgical Society of America at the Biltmore Hotel, New York City, and he was presented with the gold medal of the Society by H. H. Knox, President, for distinguished services in ferrous metallurgy. Mr. Schneider, as President of the Creusot Works, manufactured the famous French 75's. He is the first foreigner to receive the Mining and Metallurgical Society Medal. The first medal was awarded in 1914 to Herbert C. Hoover, M. Am. Soc. C. E., and Mrs. Hoover, for their translation of "De Re Metallica".

At the last Annual Meeting of the American Society of Mechanical Engineers the following creed, which was formulated by the New York Section, was adopted: "Every important enterprise must adopt competent productive management, unbiased by special privilege of capital or of labor, and disputes must be submitted to authorities based upon intrinsic law. Credit capital represents the productive ability of the community and should be administered with the sole view to the economy of productive power, that is, it should be granted only to those who are able to render valuable service."

ANNOUNCEMENTS

The Reading Room of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 6 P. M.

FUTURE MEETINGS

February 4th, 1920.—8.30 P. M.—A regular business meeting will be held, and a paper by James F. Sanborn and M. E. Zipser, Associate Members, Am. Soc. C. E., entitled "Grouting Operations, Catskill Water Supply", will be presented for discussion.

This paper is printed in this number of *Proceedings.*

February 18th, 1920.—8.30 P. M.—A meeting will be held on this evening as usual, and announcement of the programme which is in the hands of the Programme Committee for Second Meeting of Each Month, will be made later.

March 3d, 1920.—8.30 P. M.—This will be a regular business meeting. A paper by Frank G. Jonah, M. Am. Soc. C. E., entitled "The 'Light Railways' of the Battle Front in France," will be presented for discussion.

This paper is printed in this number of *Proceedings.*

March 17th, 1920.—8.30 P. M.—The usual meeting will be held, and announcement of the subject and speaker will be made later.

ROLL OF HONOR

Now that the war is over, the monthly publication in *Proceedings* of the Roll of Honor has been discontinued. It is planned to publish in the Year Book for 1920, for permanent record, a list of all the members of the American Society of Civil Engineers whose names have appeared on this list.

ENGINEERING SOCIETIES EMPLOYMENT BUREAU

Engineering Societies Employment Bureau, established December 1st, 1918, as an activity of Engineering Council, is managed by a board made up of the Secretaries of the four Founder Societies, funds for its maintenance being provided by these Societies. The work of the Bureau since its inception has been largely in the line of securing employment for men retiring from government war service. Members of the American Society of Civil Engineers who desire to register with this Bureau should apply for further information, registration forms, etc., to Walter V. Brown, Manager, Engineering Societies Employment Bureau, First Floor, Engineering Societies Building, 29 West 39th Street, New York City.

SEARCHES IN THE LIBRARY

As the Library of the American Society of Civil Engineers has been merged in the Engineering Societies Library, requests for searches, copies, translations, etc., should be addressed to the Director, Engineering Societies Library, 29 West 39th Street, New York City, who will gladly give information concerning the charges for the various kinds of service. A more comprehensive statement in regard to this matter will be found on page 21 of the Year Book for 1919.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings.*

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion will be published as heretofore in *Proceedings,* and set down for presentation to a future meeting of the Society, and, on these, oral discussion, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions.*

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 35 of the Year Book for 1919.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association, Organized 1905.

M. M. O'Shaughnessy, President; Nathan A. Bowers, Secretary-Treasurer, 502 Rialto Building, San Francisco, Cal.

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Engineers' Club, 57 Post Street, on the third Tuesday of February,

April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at noon, every Wednesday, at the Engineers' Club, where special tables are reserved for members and guests of the Association.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meetings)

October 21st, 1919.—The meeting was called to order at the Engineers' Club; President Schneider in the chair; Nathan A. Bowers, Secretary; and present, also, 87 members and guests.

The Secretary presented a communication from Mr. A. E. Chandler, former President of the California State Water Commission, in reply to the letter from the Board of Directors of the Association expressing appreciation of his services as Water Commissioner.

A letter was also presented from Capt. Milo H. Brinkley announcing his discharge from Army service, his appointment as Valuation Analyst with the Interstate Commerce Commission, and his resignation as a member of the Association.

President Schneider reported as to the success of the dinner given to Mr. Herbert C. Hoover, under the auspices of the Joint Council of Engineering Societies of San Francisco, at which about 325 were present.

Mr. H. L. Haehl reported briefly on the last session of the Committee on Development, stating that its Final Report had been presented to the Board of Direction of the Society.

Mr. H. J. Brunnier, for the Membership Committee, urged the co-operation of the membership in securing new members for the Society and for the Association.

Mr. E. T. Thurston presented the need for prompt action in regard to contributions to the fund in support of the proposed National Department of Public Works being collected from the members of the Association.

Mr. Jerome Newman, for the Committee co-operating with the State Civil Service Commission, reported that the Commission was working on the reclassification of the engineering branches and that when the work was completed it had been planned to have a joint meeting of engineering society committees to consider the matter further.

Reporting for the Entertainment Committee, President Schneider described the trip to the California-Hawaiian Sugar Company's plant and asked for suggestions as to other field trips.

Professor Charles D. Marx stated that the report of the Committee on Development presented to the Board of Direction of the Society, had been referred to a Special Committee of the Board and that a final report was expected to be in the hands of the members of the Society by November 15th.

Secretary Bowers who had just returned from a trip to the Northwest, reported on what he had found of interest to the Association in the activities of the Engineering Societies of Portland, Seattle, Vancouver, and Spokane, and, relative to improving the work of the Asso-

ciation, suggested that at least one member of the Board of Directors attend the Wednesday luncheons, that members of the Association bring ideas for discussion to those luncheons, and that a little time be given at the meetings of the Association to plan for its general improvement.

President Schneider introduced Mr. M. M. O'Shaughnessy who addressed the meeting on "The Hetch Hetchy Project", in the course of which he described the engineer's side of the work from the beginning.

On motion, duly seconded, a vote of thanks was extended to Mr. O'Shaughnessy for his address.

Adjourned.

December 16th, 1919.—The Fifteenth Annual Meeting of the Association was held at the Engineers' Club; President Schneider in the chair; Nathan A. Bowers, Secretary; and present, also, 90 members and guests.

Letters were presented from several members of the Association who have retained their membership although they have removed from San Francisco.

The Secretary read a letter transmitted recently by the Joint Council of Engineering Societies of San Francisco to the Board of Supervisors, which contained the following resolution:

"Resolved: That the Joint Council of Engineering Societies of San Francisco, representing over 1 100 members of the Engineering Profession, publicly disapproves, and repudiates, the recent action of the Board of Supervisors of the City and County of San Francisco, criticizing the legal processes of our Government rightfully invoked to prevent the general strike of the bituminous coal miners; and

"Further, That the said Board of Supervisors be hereby reminded that it has exceeded its authority in attempting to take public action on a matter plainly without the duties for which it has been created."

Extracts from communications and bulletins from Engineering Council and from its National Service Committee in Washington, relative to its various activities, were presented by the Secretary.

The report of the Treasurer for 1919 was presented, and the Secretary explained briefly the causes of the increased expenditure, such as printing, etc.

President Schneider reported that at a recent meeting of the Board of Directors of the Association it was decided that hereafter the space allotted in *Proceedings* to the abstract of the paper of the evening should not exceed one or two paragraphs, the remaining space to be devoted to business reports, Association affairs, etc.

In presenting his report, the Secretary stated that evidence of the interest of the membership in the Association was noticeable, that the net gain in membership in 1919 was 11, and that the total membership is 211.

A letter relative to the place for holding the 1920 Annual Convention of the Society, from Mr. Harry Hawgood, Director from District No. 11, was read, and, in reply, the following resolution of the Board of Directors, on motion, duly seconded, was unanimously adopted by the meeting and ordered sent to Secretary Hunt:

"Whereas, The next Annual Convention of the American Society of Civil Engineers is to be held in District 11, and

"Whereas, The larger part of the membership of Districts 10, 11, 12, and 13 is included in the Pacific Coast States of Washington, Oregon, and California,

"Resolved, That the San Francisco Association of Members of the American Society of Civil Engineers assembled in annual meeting requests that the Annual Convention of 1920 be held in Los Angeles, believing that this will enable a large number of Pacific Coast members to attend, will afford an opportunity for delegates from the East to meet members from the Pacific Coast and will promote closer relations between the different sections of the membership."

Mr. Jerome Newman, for the Civil Service Committee, reported progress in connection with its work with the State Civil Service Commission.

Mr. C. E. Grunsky reported that Professor Charles D. Marx had been appointed as Chairman of a State Committee to collect funds to further the proposed organization of a National Department of Public Works, and asked for contributions.

President Schneider discharged with thanks the Committees on Membership, Entertainment, Public Relations, and Development.

Professor Marx reviewed briefly the recent activities of the Joint Council of Engineering Societies of San Francisco for the benefit of the membership.

It was announced that a special meeting of the Association would be held at the Engineers Club on January 20th, 1920, to discuss with O. E. Meinzer, Chief of the Ground-Water Division, of the U. S. Geological Survey, a glossary of terms pertaining to ground-water, at which Mr. Charles H. Lee would preside.

Plans for an Engineering Building in San Francisco were discussed briefly by Mr. E. C. Hutchinson.

President Schneider appointed Messrs. Lee, McWethy, Bolin, Holly, and Saph, as tellers to canvass the ballot for officers for the ensuing year. The following officers were elected: President, M. M. O'Shaughnessy; First Vice-President, F. E. Muhs; and Second Vice-President, W. L. Huber.

Mr. Francis Betts Smith presented a paper entitled "Building the Pearl Harbor Dry Dock", illustrating his description of the work with lantern slides. The subject was discussed further by Messrs. S. G. Hindes, J. D. Galloway, and others.

Adjourned.

Colorado Association, Organized 1908.

W. C. Huntington, President; A. N. Miller, Secretary-Treasurer, 1400 West Colfax Avenue, Denver, Colo.

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary. The meetings are usually preceded by an

informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesday, at 12.30 P. M., at Daniels and Fisher's.

Visiting members are urged to attend the meetings and luncheons.

Atlanta Association, Organized 1912.

V. H. Kriegshaber, President; Howard L. Stillwell, Secretary-Treasurer, 533 Trust Co. of Georgia Bldg., Care, Southeastern Underwriters' Association, Atlanta, Ga.

Informal luncheons are held for members of the Association on the last Monday of each month, at 12.30 P. M., to which visiting members of the American Society of Civil Engineers will be welcomed. The place is not fixed, but this information will be furnished on application to the Secretary.

Baltimore Association, Organized 1914.

H. G. Perring, President; Charles J. Tilden, Secretary-Treasurer, The Johns Hopkins University, Baltimore, Md.

Cleveland Association, Organized 1914.

W. P. Brown, President; George H. Tinker, Secretary-Treasurer, 516 Columbia Building, Cleveland, Ohio.

The regular meetings of the Association are held on the second Wednesday of each month, at 12.15 P. M., in the Rooms of the Electrical League, on the Fourteenth Floor of the Statler Hotel. Luncheon is served at these meetings, and visiting members are invited to attend.

(Abstract of Minutes of Meeting)

December 10th, 1919.—The meeting was called to order at the rooms of the Cleveland Engineering Society at 12.15 P. M.; President Richards in the chair; George H. Tinker, Secretary; and present, also, 16 members.

The minutes of the meeting of November 11th, 1919, were read and approved.

Messrs. A. V. Ruggles, C. G. French, and A. F. Blaser were appointed as a Nominating Committee by President Richards.

The Secretary presented a communication from the Ohio Association of Technical Societies in reference to a proposed schedule of salaries for engineering employees in the State Civil Service. On motion, duly seconded, it was decided that the schedule was too low and should be the minimum considered at the present time.

The Committee appointed to report on the schedule of minimum fees for civil engineers adopted by the Engineers of Mahoning Valley, submitted a schedule of minimum fees for practicing engineers. On motion, duly seconded, the schedule was approved.

The Nominating Committee reported the following recommendations for officers for 1920: For President, W. P. Brown; Vice-President, J. E. A. Moore; and Secretary-Treasurer, George H. Tinker; and, on motion, duly seconded, the nominees were declared elected.

On motion, duly seconded, it was decided that the Director of the Association on the Board of the Association of Ohio Technical Societies should be paid seven cents a mile to cover expenses when attending Board meetings.

On motion, duly seconded, the dues for 1920 were fixed at $2.00.

Adjourned.

Connecticut Association, Organized 1919.

C. M. Saville, President; R. J. Ross, Secretary, Municipal Building, Hartford, Conn.

The Annual Meeting of the Association is held in April. The time and place of other meetings are not fixed, but this information will be furnished on application to the Secretary.

Detroit Association, Organized 1916.

T. A. Leisen, President; Clarence W. Hubbell, Secretary, 2348 Penobscot Building, Detroit, Mich.

The regular meetings of the Association are held on the second Friday of December, April, and October, the last being the Annual Meeting.

District of Columbia Association, Organized 1916.

David S. Carll, President; James C. Van Wagenen, Secretary-Treasurer, 719 Fifteenth Street, N. W., Washington, D. C.

Duluth Association, Organized 1917.

G. A. Taylor, President; Walter G. Zimmermann, Secretary, Wolvin Building, Duluth, Minn.

The regular meetings of the Association are held at noon on the third Monday of each month (usually at the Kitchi Gammi Club), with luncheon, followed by a short business session and the reading of papers. Visiting members of the American Society of Civil Engineers can secure from the Secretary definite information relative to the meetings, at which they will be welcomed. The Annual Meeting is held on the third Monday in May.

Illinois Association, Organized 1916.

Albert Reichmann, President; W. D. Gerber, Secretary-Treasurer, 913 Chamber of Commerce, Chicago, Ill.

The regular meetings of the Association are held on the second Monday of March, June, September, and December, the last being the Annual Meeting. The hour and place of meetings are not fixed, but this information will be furnished on application to the Secretary.

Louisiana Association, Organized 1914.

Arsène Perrilliat, President; Eugene F. Delery, Secretary, 503 City Hall Annex, New Orleans, La.

The regular meetings of the Association are held at The Cabildo, New Orleans, La., on the first Monday of January, April, July, and October.

Nebraska Association, Organized 1917.

Clark E. Mickey, President; Homer V. Knouse, Secretary-Treasurer, 200 City Hall, Omaha, Nebr.

Regular meetings of the Association are held on the first Saturday of each month, except July and August, and at such places as may be appointed from time to time by the Executive Committee. The Annual Meeting is held in Lincoln, Nebr., on the second Friday in January.

Visiting members of the Society are especially urged to communicate with the Secretary when in the city.

Northwestern Association, Organized 1914.

Ralph D. Thomas, President; W. N. Jones, Secretary, City Engineer's Office, City Hall, Minneapolis, Minn.

The meetings of the Association are held bi-monthly, alternating between St. Paul and Minneapolis, on the third Friday of each month. Information as to the time and place of such meetings will be furnished on application to the Secretary.

Philadelphia Association, Organized 1913.

S. M. Swaab, President; Henry T. Shelley, Secretary, 416 City Hall, Philadelphia, Pa.

The regular meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street, on the first Monday in January, April, and October, the last being the Annual Meeting. Special meetings will also be held during the winter, in order to provide an opportunity for members to take a more active part in the work of the Association.

(Abstract of Minutes of Meeting)

November 22d, 1919.—A special meeting of the Association was called to order at the Engineers' Club of Philadelphia, at 8 P. M.; President S. M. Swaab in the chair; H. T. Shelley, Secretary; and present, also, 60 members.

The meeting was called to review and discuss the Final Report of the Committee on Development of the Society, and to decide on definite action for its support.

The attention of the members was called to the tendency to subordinate the engineering features of public works to art and architecture, by Mr. F. Herbert Snow, who presented the following resolution which, on motion, duly seconded, was adopted by the meeting:

"Whereas, In the design and erection of bridges and other similar public structures, involving fundamentally strictly engineering questions, there is a widespread tendency to subordinate engineering to art and architecture, and

"Whereas, The formation of commissions and the selection of the personnel to have the direction of the execution of these works is now under consideration by state, county and municipal authorities,

"Therefore be it Resolved, That the Philadelphia Association of Members of the American Society of Civil Engineers earnestly directs

the attention of the Governor of the State, the County Commissioners and the Mayors of cities in the State to the fact that safety to human life and the proper expenditure of public funds require that the design and erection of such structures be under the responsible charge of competent and experienced civil engineers, especially skilled and trained for that class of work."

Mr. Richard L. Humphrey outlined the report of the Committee on Development and moved that an Executive Committee be appointed to conduct a campaign in behalf of the proposed development and that through such Committee teams of five or ten members, headed by a captain, be organized to make a personal canvass of the members of the Society and if possible secure their pledge to attend the Annual Meeting of the Society and support the report at that meeting and thereafter until a final vote on it is taken. On motion, duly seconded, the resolution was carried by a unanimous vote.

President Swaab appointed the following as members of the Executive Committee: Messrs. Benjamin Franklin, F. Herbert Snow, Samuel T. Wagner, Jonathan Jones, and Richard L. Humphrey, Chairman, with himself and Secretary Shelley as *ex-officio* members.

The Auditing Committee appointed to examine the accounts of the Secretary and Treasurer, submitted its report stating that the accounts were correct, and, on motion, duly seconded, the Committee was discharged with thanks.

The Secretary read a communication from the Engineers', Architects' and Constructors' Council, requesting the support of the Association for the bill to create a National Department of Public Works. On motion, duly seconded, it was decided to defer action on the request until the January meeting of the Association.

Adjourned.

Pittsburgh Association, Organized 1917.

Morris Knowles, President; Nathan Schein, Secretary-Treasurer, 426 City-County Building, Pittsburgh, Pa.

The Annual Meeting of the Association is held on the first Monday in October. The time and place of other meetings are not fixed, but this information will be furnished on application to the Secretary.

Portland (Ore.) Association, Organized 1913.

E. Burslem Thomson, President; C. P. Keyser, Secretary, 318 City Hall, Portland, Ore.

The Annual Meeting of the Association is held on the second Friday in January. Other meetings are called by the President and are usually convened on Friday evenings. The place is not fixed, but this information may be obtained on application to the Secretary. All members of the American Society of Civil Engineers are cordially invited to attend the meetings.

St. Louis Association, Organized 1888 (Constitution Approved by Board, 1914).

Edward E. Wall, President; C. W. S. Sammelman, Secretary-Treasurer, 300 City Hall, St. Louis, Mo.

The Annual Meeting of the Association, for the election of officers and for the transaction of business, is held on the fourth Monday in November. Two meetings each year, for the presentation and discussion of technical papers, are held in the Auditorium of the Engineers' Club of St. Louis and are open to members of the Associated Societies. Other "get-together" meetings are held regularly for dinner or luncheon on the fourth Monday of each month except July, August, and November.

San Diego Association, Organized 1915.

W. C. Earle, President; R. C. Wueste, Secretary-Treasurer, Bonita, Cal.

Seattle Association, Organized 1913.

L. M. Grant, President; G. A. Collins, Secretary, 1317 L. C. Smith Building, Seattle, Wash.

The regular meetings of the Association, with luncheon, are held at the Engineers' Club, Arctic Building, Third Avenue and Cherry Street, at 12.15 P. M., on the last Monday of each month. Informal luncheons are also held at 12.15 P. M., every Monday at the Engineers' Club.

Special evening meetings are held from time to time for the purpose of discussing important topics, and information concerning these meetings may be had by addressing the Secretary. All members in any grade of the American Society of Civil Engineers are cordially invited to attend the meetings when in the vicinity, and, if located in this District for any length of time, their membership in the Association will be appreciated.

Southern California Association, Organized 1914.

W. K. Barnard, President; Floyd G. Dessery, Secretary, 514 Central Building, Los Angeles, Cal.

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular monthly meetings on the second Wednesday of each month, the December meeting being the Annual Meeting.

Informal luncheons in connection with the Joint Technical Societies of Los Angeles are held at 12.15 P. M., every Thursday at the Broadway Department Store Café.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

(Abstract of Minutes of Meeting)

December 10th, 1919.—The Annual Meeting of the Association was called to order at the Jonathan Club, at 7.40 P. M.; Vice-President H. W. Dennis in the chair; F. G. Dessery, Secretary; and present, also, 60 members and guests.

On motion, duly seconded, the reading of the minutes of the meeting of November 12th, 1919, was omitted.

Chairman Moody, of the Committee on Co-operation of Federal Bureaus, gave a detailed verbal report of the extent of the work and

efforts of the Committee. On motion, duly seconded, the report was accepted and the Committee discharged.

Chairman Schwendener, of the Committee on Building Laws and Regulations, reported on the joint work of the Committee with a similar committee of the Chamber of Commerce. On motion, duly seconded, the report was accepted and the Committee discharged.

Chairman Irving, Association Member of the Joint Technical Societies Committee on Public Health and Sanitation, reported that a Final Report of the Committee would be made to the Board of County Supervisors on February 24th, 1920. On motion, duly seconded, the report was accepted and the Committee continued.

Mr. W. D. Smith, Association Member of the Joint Technical Societies Committee on City Planning, presented a progress report on the work of the Committee to date. On motion, duly seconded, the report was accepted and the Committee continued.

Vice-President Dennis, Permanent Chairman of the Committee on Ways and Means—1920 Convention, outlined briefly the work of this Committee to date.

In relation to holding the Annual Convention of 1920 in Los Angeles, Messrs. Allin and La Rue, of Pasadena, reported in regard to the interest of the Pasadena Board of Trade in the matter. Mr. Code reported on the apparent apathy of the Los Angeles Chamber of Commerce relative to the Convention and suggested that individual members of the Association underwrite $5 000 to cover the expenses in connection with it. The matter was also discussed by Messrs. Flaherty, Hawgood, Storrow, Michael, Mulholland, and Barnard, and, on motion, duly seconded, it was decided unanimously that Director Hawgood be instructed to bring the Annual Convention of the Society to Los Angeles in 1920.

Reports from the Sub-Committees of the Committee on Development of the Association were presented.

Mr. Bowen, Chairman of the Sub-Committee on External Relations, read the report of his Committee, which, on motion, duly seconded, was temporarily laid on the table, but, later, was referred back to the Committee.

The reports of the Sub-Committees on Technical Activities, Professor Michael, Chairman, on Internal Relations, Chairman Morris, and on Public Affairs, Chairman Moody, were read and, on motion, duly seconded, adopted.

On motion, duly seconded, the general report of the Committee on Development was approved, subject to the modifications recommended by the Sub-Committee.

Chairman Leeds, of the Committee on Universal Military Training, presented a report and Mr. Rockhold presented a Sub-Committee report. On motion, duly seconded, the report of the Committee was accepted, and it was ordered that the report of the Sub-Committtee be added to the Committee's report as an Appendix.

On motion, duly seconded, the Secretary was instructed to carry out the terms contained in the preliminary report of the Committee on Universal Military Training, which report was adopted at the meeting of November 12th, 1919.

Vice-President Dennis announced the death of Mr. George C. Adams, the father of Mr. E. L. Adams, member of the Association, and,

on motion, duly seconded, the Chairman appointed Messrs. Reed, E. R. Bowen, and E. T. Wheeler a committee to draft suitable resolutions to be spread upon the minutes of the Association and a copy to be sent to Mr. Adams.

The Annual Report of the Secretary for 1919 was read, and, on motion, duly seconded, the report was approved and a rising vote of thanks was extended to the Secretary for his work; a copy of the report was also ordered to be sent to the Society.

On motion, duly seconded, the following resolution was unanimously adopted:

"*Whereas,* Mr. George G. Anderson has ably served this Association as its President during the past year, and now at the completion of his term is retiring from office, and

"*Whereas,* He has been a most active member of the Committee on Development of the Parent Society and the Conference Committee, and has been a directing force in their deliberations, and

"*Whereas,* He has been uniformly and consistently alive to the welfare of the younger members of the profession, and

"*Whereas,* This Association, under his direction, has experienced the most successful year in its history. Now, therefore,

"*Be it Resolved,* That this Association hereby extends to Mr. Anderson its thanks and appreciation of his unselfish and tireless efforts in its behalf, and that these resolutions be spread upon the minutes of this Association and that a copy thereof be sent to Mr. Anderson."

In the absence of President Anderson, Vice-President Dennis read his valedictory address.

The Treasurer presented his Annual Report for 1919. On motion, duly seconded, the report was approved and adopted and Mr. Reed was thanked for his work as Treasurer of the Association.

The Secretary announced the election of the following officers for 1920: President, W. K. Barnard; Vice-Presidents, H. W. Dennis and R. J. Reed; Secretary, F. G. Dessery; and Treasurer, W. Woodard.

Vice-President Dennis introduced President Barnard who addressed the meeting briefly.

A general discussion on the imperative need of individual effort on behalf of the Annual Convention for 1920 was participated in by those present at the meeting.

Adjourned.

Spokane Association, Organized 1914.

Alfred D. Butler, President; Charles E. Davis, Secretary-Treasurer, 401 City Hall, Spokane, Wash.

The regular meetings of the Association are held on the second Friday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Visiting members are invited to attend the meetings.

Texas Association, Organized 1913.

Hans Helland, President; E. N. Noyes, Secretary, Dure Building, Dallas, Tex.

(Abstract of Minutes of Meetings)

October 17th, 1919.—The Semi-Annual Meeting of the Association was called to order in the Chamber of Commerce Building, Fort Worth, Tex., at 10.30 A. M.; President Potts in the chair; J. H. Brillhart, Secretary; and present, also, 19 members.

Dr. C. C. Gumm, Manager of the Fort Worth Chamber of Commerce, delivered the address of welcome, to which President Potts responded.

The minutes of the previous meeting were read and approved.

The following Committee on Resolutions was appointed: Messrs. E. N. Noyes, Chairman, J. C. McVea, and F. J. Von Zuben.

On motion, duly seconded, the stand of *Engineering-News Record* in not yielding to the demands of the printers during the recent strike in New York City, was endorsed, and the President sent a telegram to the management relative to the Association's endorsement of its action.

The subject of the proposed National Department of Public Works was discussed by Messrs. W. J. Powell, Davis, Windrow, Brillhart, and Potts.

The question of the place for holding the 1920 Annual Convention of the Society was discussed generally.

The meeting reconvened at 3.00 P. M.; President Potts in the chair; J. H. Brillhart, Secretary.

The meeting was addressed by Mr. C. S. Fowler, of the State Highway Commission, on "Seventy-five Million Dollar Bond Issue Amendment" and also on the Maintenance Tax Amendment, and the subject was discussed by Messrs. Dutton, McClellan, Windrow, and Potts.

Mr. Brillhart presented the report of the Committee on Development, and Mr. Howe presented the report of the Highway Committee. On motion, duly seconded, the Highway Committee was continued.

Mr. J. M. Howe, Chairman, presented the report of the Licensing Committee and, on motion, duly seconded, the Committee was discharged with thanks.

Adjourned.

The meeting reconvened at 9.00 P. M.; President Potts in the chair; J. H. Brillhart, Secretary.

The following officers for 1920 were elected: President, Hans Helland; First Vice-President, C. M. Davis; Second Vice-President, J. H. Brillhart; and Secretary-Treasurer, E. N. Noyes.

A paper by Mr. J. C. Nagle, entitled "Administration Problems of Maintenance of Efficiency in Engineering Instruction" was presented by the author, which was followed by a brief address by Professor Giesecke on "Rodding Concrete".

Twelve engineers were elected to membership in the Association.

Adjourned.

October 18th, 1919.—The meeting was called to order at 10.30 A. M. at the Chamber of Commerce Building; President Potts in the chair; J. H. Brillhart, Secretary

On motion, duly seconded, a Publication Committee was appointed.

The report of the Treasurer was presented and, on motion, duly seconded, was accepted.

On motion, duly seconded, the Secretary was instructed to write to the Board of Directors endorsing the action of the Pittsburgh Association in reference to the compensation of engineers.

On motion, duly seconded, the Board of Directors and Mr. Howe were instructed to canvass the city and decide where the 1920 Annual Convention of the Society should be held. Later, the Committee decided that the Society be invited to hold its Annual Convention in Houston, with visits to Galveston and San Antonio, which decision was, on motion, duly seconded, approved as the unanimous vote of the Texas members.

The meeting was addressed by Mr. Harry Hawgood, Director from the 11th District, on the subjects of 1920 Annual Convention and the Report of the Committee on Development of the Society.

Adjourned.

Utah Association, Organized 1916.

A. B. Villadsen, President, 304 Dooly Bldg., Salt Lake City, Utah.

The Annual Meeting of the Association is held on the first Wednesday in April. The time of other meetings is not fixed, but this information will be furnished on application to the President.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcome in the Reading Rooms and at the meetings of many engineering societies in all parts of the world. A list of such societies will be found on pages 41 and 42 of the Year Book of the Society for 1919.

ANNUAL REPORT OF THE BOARD OF DIRECTION FOR THE YEAR ENDING DECEMBER 31st, 1919.

In compliance with the Constitution, the Board of Direction presents its report for the year ending December 31st, 1919:

MEMBERSHIP

The changes in membership are shown in the following table:

	Jan. 1st, 1919.			Jan. 1st, 1920.			Losses.				Additions.		Totals.		
	Resident.	Non-Resident.	Total.	Resident.	Non-Resident.	Total.	Transfer.	Resignation.	Dropped.	Death.	Transfer.	Election.	Loss.	Gain.	Increase.
Honorary Members	.....	3	3	.....	3	3	....	..	..	...	.....	.....	....	.....	...
Corresponding "	.....	1	1	.....	1	1	....	..	..	...	.....	.....	....	.....	...
Members	688	3 094	3 782	762	3 232	3 994	....	16	..	61	*162	‡127	77	289	212
Associate Members	612	3 768	4 380	694	4 015	4 709	162	46	1	21	†101	‖58	230	559	329
Associates	61	104	165	65	104	169	1	3	..	1	.....	9	5	9	4
Juniors	110	482	592	116	406	522	100	21	35	7	.....	¶93	163	93	§70
Fellows	.....	10	10	.....	10	10	....	..	..	..	.....	.....	....	....	...
Totals	1 471	7 462	8 933	1 637	7 771	9 408	263	86	36	90	263	687	475	950	475

* 162 Associate Members.
† 1 Associate, 100 Juniors.
‡ 3 Reinstatements.
‖ 4 Reinstatements.
¶ 1 Reinstatement.
§ Decrease.

The net increase in membership for the year is 475.

The total number of applications received has been 1 196: 873 for admission and 323 for transfer.

The losses by death during the year number 90, and are as follows:

Members (61): Hermon Charles Allen, William Archer, Percy Herbert Ashmead, Owen Brainard, Holland Williams Baker, Frederick Brooks, Ralph Henry Brown, Stephen Pearson Brown, Rolla Clinton Carpenter, Charles Titus Church, Theodore Cooper, Chester Birge Davis, Adna Dobson, William Thomas Dougan, William Griffing Ford, Archibald Smith Frew, Harvey Mosher Geer, Walter Hayden Graves, Harry Hardy, William Appleton Haven, Arthur Haviland, John Vose Hazen, James Nisbet Hazlehurst, John Gibson Hendrie, Albert James Himes, Henry Wilson Hodge, Frank Churchill Horn, Rufus Cameron Hunt, Linn Murdoch Huntington, Charles Mattathias Jacobs, Thomas William Jaycox, Tien Yow Jeme, Norman Benjamin Kellogg, Paul Sourin King, Marvin Watson Kingsley, George Stevens Leavenworth, Henry Manley, Robert Edgar Milligan, George Clark Mills, William

Newbrough, Lewis Abel Nichols, John Patrick O'Donnell, John Christian Ostrup, Henry Kinder Owens, Carl Redlich, Homer Peter Ritter, Henry Burger Sauerman, Hermann Frederick August Schussler, Naoji Shiraishi, Hiram Joseph Slifer, Raphael Chart Smead, Fred Caswell Stanton, Frederic Pike Stearns, Henry Morton Stone, Mason Romeyn Strong, Emil Swensson, George Sykes, Carl Uhlig, Robert Van Buren, Rufus Mason Whittet, Irving Sparrow Wood.

Associate Members (21): Paul Jones Bean, Bernt Berger, Charles Edwin Bright, Gustavo Adolfo Dubois, William Wetmore Gibbs, Norman Marshall Halcombe, Robert Dwiggins Monteith Henley, John William Horton, Grandville Reynard Jones, Paul Robert Kirstein, Charles H. Knowles, Angus Robert Mackay, Thomas Hatcher Matson, Allen Eugene Nichols, Walter Scott Obermeyer, George Thomas Petheram, Alexander Charles Schilling, George Hippesley Stanley Stephens, George M. Stevens, Burt Stimson, Rafael Joaquin Torralbas.

Associates (1): Hugh Monroe Wilson.

Juniors (7): Victor Hugo Bell, Dean Chase, Ralph Richardson Marrian, Charles Gilbert Reilly, Hugo S. Speidel, Jay William Toms, John Wesley White.

LIBRARY

The combined Engineering Societies Library (to which, it will be remembered, the 67 000 volumes of this Society have been transferred but which still belong to this Society) received during 1919 a total of 2 937 volumes (2 384 by gift, 553 by purchase), 3 437 pamphlets (3 205 by gift, 232 by purchase), and 118 maps and plans, making a total of 148 870 now in the permanent collection. The American Institute of Mining and Metallurgical Engineers transferred to the Engineering Societies Library the income from a bequest of $100 000 by Dr. James Douglas, amounting to approximately $5 000.

The expenditures for the work of the Library amounted to about $24 000. A continually increasing use of the Library is indicated in the total attendance for the year, which reached 22 042 as compared with 12 820 in 1915; 13 848 in 1916; 11 381 in 1917; and 15 063 in 1918. The attendance after 6 P. M. was 15%, or 3 470. The average daily attendance was 72.

The work of reclassifying and recataloguing, for which each of the four Founder Societies is contributing $2 500 per year for two years, was begun July 1st, and 6 671 volumes have been catalogued at an expense of about $4 360.

The Service Bureau approximately paid for itself, with a total income of about $19 000. It made during the year 552 searches and copies of searches, and 71 translations, totaling 227 300 words. The value of the equipment for making photographic copies of articles has been more evident than ever before and the demands at times have

taxed the capacity of the Bureau to the limit. The orders amounted to 2 319 and required 23 951 prints, an increase of 101% over the number of orders in 1918.

READING ROOM

The Reading Room of the Society has shown an increase in the attendance, as compared with that of 1918, of about 31%, the total for the year being 4 283. The facilities for correspondence, for receiving mail, and for obtaining general information have been increasingly used. During the past year there have been received regularly 290 technical and non-technical magazines. Several new periodicals have been added to the list, while others received heretofore have been suspended from publication owing to war conditions. The more important technical periodicals are indexed and kept on file for ready reference. The collection of recent technical books has been enlarged, both by purchase and by donation from members of the Society.

The Reading Room attendants prepared the list of references to current engineering literature for *Proceedings*, which required 93 pages and contained 3 725 classified references to 89 periodicals. Some of the French and German periodicals which were not available during the War are now regularly received and indexed.

COMMITTEES

There are at present four Special Committees appointed to report on Engineering subjects, namely: To Codify Present Practice on the Bearing Value of Soils for Foundations; Regulation of Water Rights; Stresses in Railroad Track; and Highway Engineering. A second Progress Report has been received from the Committee on Stresses in Railroad Track, and Progress Reports are expected from two of the other Committees.

The Final Report of the Committee on Engineering Education was presented at the last Annual Meeting and the Committee was discharged.

The Special Committee on Highway Engineering was appointed by the Board during the year, to keep in touch with the development of the Government's plan for the construction and financing of National highways and to advise the Society of these plans and activities by the submission of frequent or periodic reports or critical reviews.

The Final Report of the Committee on Development has been forwarded to all members of the Society, and will be one of the topics for discussion at the Annual Meeting.

DELEGATION TO VISIT FRANCE

The object of this Delegation was to discuss with the French engineers the large engineering problems now facing France. The result of their visit and deliberations was published in *Proceedings* for August, 1919, pages 604-680.

A Permanent Franco-American Engineering Committee has been formed of two members appointed by each of the four Founder Societies.

ENGINEERING SOCIETIES EMPLOYMENT BUREAU

As announced in the last Annual Report, the Engineering Societies Employment Bureau was established under the management of the Secretaries of the four Founder Societies.

During the year more than 20 000 men have been interviewed, and 5 377 have registered with the Bureau. Of these, 1 256 are known to have been placed, but this does not represent the result because of the difficulty of getting reports from men after they have obtained positions. The large number of daily visitors to the Bureau indicates clearly that it was much needed, and that it will be of increasing value as the work it is doing becomes better known to employers.

PUBLICATIONS

During the year eight numbers of *Proceedings,* one volume of *Transactions,* and one Year Book have been issued. Owing to a strike in the printing trade, it was not possible to issue the October and November numbers of *Proceedings;* the number for December covered the last three months of 1919.

As a war measure and a matter of economy, it was decided last year that no volume of *Transactions* should be issued in 1919. It is expected that publication will be resumed next year. At the present time nearly 1 600 pages of type matter are being held for this purpose.

During the year the membership was canvassed to determine whether the Year Book should be changed to contain a single alphabetical list, without separate divisions for the various grades. The vote being favorable, the Year Book for 1920 will be published in the revised form. The Roll of Honor will be printed in this Year Book, to provide a permanent record of those who took part in the World War.

The stock of the various publications of the Society, kept on hand for the convenience of members and others, now amounts to 152 317 copies, the cost of which to the Society, for paper and press work only, has been $22 934.56.

Summary of Publications for 1919

	Issues.	Average edition.	Total pages.	Plates.	Cuts.
Proceedings (monthly numbers)	8	9 100	2 096	19	144
Transactions, Vol. LXXXII	1	9 000	1 775	48	610
Year Book	1	9 400	415	1	..
Total	10	....	4 286	68	754

The cost of publications has been:

For Paper, Printing, etc., *Proceedings* and *Transactions*	$30 502.18
For Plates and Cuts	1 128.53
For Boxes, Copyright, and Sundry Expenses	451.98
For 5 971 Extra Copies of Papers and Memoirs	338.88
For Year Book	4 408.31
Total	$36 829.88
Deduct amount received from sale of publications	3 234.19
Net expenditure for publications for 1919	$33 595.69

Vol. LXXXII, which was published during this year, was really the volume of *Transactions* for the year 1918.

MEETINGS

Twenty-three meetings were held during the year, as follows: At the Annual Meeting, 3; at the Annual Convention 3; and 17 other meetings, all of which were held at Society Headquarters in the Engineering Societies Building.

At these meetings there were presented 5 formal papers, 3 of which were illustrated with lantern slides, 8 lectures and addresses, 6 of which were illustrated with lantern slides and motion pictures, and 8 informal discussions, 3 of which were illustrated with lantern slides. The number of members and others who took part in the preparation and discussion of these papers, lectures and addresses, and informal discussions was 155.

The Annual Convention, which had been abandoned for two years on account of war conditions, was held in the "Twin Cities" of St. Paul and Minneapolis, Minn., from June 17th to 20th, 1919, inclusive.

The total attendance at the 23 meetings was about 4 151. The registered attendance at the Annual Meeting was 933, and at the Annual Convention 149, but this does not include many members and guests present, who failed to register.

In the absence of regularly scheduled technical papers, the following topics have been presented, many of which have been illustrated by lantern slides:

January 15, 1919, "The Construction Work Carried on in the United States During the War", by Brig.-Gen. R. C. Marshall, Jr., U. S. A.

January 16, 1919, "The War and the American Soldier", by Brig.-Gen. S. T. Ansell, U. S. A.

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February 19, 1919, "New Developments in Concrete", by Nathan C. Johnson.

March 5, 1919, "Engineering Construction in Russia, and General Conditions in that Country from the Viewpoint of an Engineer", by Vladimir V. Goriachkovsky.

March 19, 1919, "The New York and New Jersey Vehicular Tunnel": An Informal Discussion.

April 16, 1919, "American Highways": An Informal Discussion.

May 21, 1919, "Fixed Ammunition Loading, Inspecting, and Firing", by Joseph Dean Evans.

June 4, 1919, "The Organization of a Local Association of Members of the Society in the New York City District": An Informal Discussion.

June 17, 1919, "Engineering Activities of the 'Twin Cities'", by F. C. Shenehon.

June 19, 1919, "The Work of Army Troops of the American First Army in France", by F. W. Scheidenhelm.

September 17, 1919, "The Need of a National Department of Public Works": An Informal Discussion.

October 15, 1919, "The Relation of the Engineer to the Future Military Activities of the United States": An Informal Discussion.

November 5, 1919, "The Compensation of Engineers": An Informal Discussion.

November 19, 1919, "The Proposed Nationalization of Railroads in the United States": An Informal Discussion.

December 3, 1919, The Report of the Committee on Development of the American Society of Civil Engineers: An Informal Discussion.

December 17, 1919, "An Engineer's Rambles in Central and South America", by William V. Alford.

The Board Room, Past-Presidents' Room, and General Office of the Society, in addition to their use by the Board of Direction and by Committees of the Society, have been used by other organizations (United Engineering Society, Americanization Committee, National Research Council, American Welding Society, American Society of Mechanical Engineers' Committees, Engineering Foundation, Engineering Council, American Society for Testing Materials, War Department Sub-Committees, and sixteen others) for 88 meetings.

MEDALS AND PRIZES

For the year ending with July, 1918, prizes were awarded as follows:

The Norman Medal to L. R. Jorgensen, M. Am. Soc. C. E., for his paper entitled "Multiple-Arch Dams on Rush Creek, California".

The J. James R. Croes Medal to Israel V. Werbin, Assoc. M. Am. Soc. C. E., for his paper entitled "Tunnel Work on Sections 8, 9, 10, and 11, Broadway-Lexington Avenue Subway, New York City".

The Thomas Fitch Rowland Prize to F. W. Scheidenhelm, M. Am. Soc. C. E., for his paper entitled "The Reconstruction of the Stony River Dam".

The James Laurie Prize to Charles W. Staniford, M. Am. Soc. C. E., for his paper entitled "Unusual Coffer-Dam for a 1 000-Foot Pier, New York City".

The Collingwood Prize for Juniors to James B. Hays, Jun. Am. Soc. C. E.*, for his paper entitled "Designing an Earth Dam Having a Gravel Foundation, with the Results Obtained in Tests on a Model".

MEMBERS IN SERVICE

There were 1 823 members of the Society in the Military or Naval Service of the United States or its Allies, according to the records of the Secretary's office. Of these there were in the American Army 1 610, American Navy 113, British Army 65, French Army 8, and Italian Army 1.

A general summary of this service follows:

Armies		American Navy	
Major-Generals	10	Rear-Admirals	5
Brigadier-Generals	21	Captains	7
Colonels	80	Commanders	20
Lt.-Colonels	87	Lt.-Commanders	16
Majors	334	Civil Engineers (rank not given)	6
Commandant	1	Lieutenants	28
Captains	669	Lieutenants (Junior Grade)	17
First Lieutenants	312	Ensigns	10
Second Lieutenants	95	Chief Machinist's Mate	1
Master Engineers	8	Chief Carpenter's Mate	1
Master Gunners	2	Marine	1
Sergeants	31	Miscellaneous	1
Corporals	10	Total	113
Privates	23		
Students, Training Camps	18		
Miscellaneous	9		
Total	1 710		

Total, 1 823.

Died in Service, 26.

FINANCES.

Inasmuch as in the last Annual Report the general financial condition of the Society was discussed fully, it appears to be unnecessary

* Now Assoc. M. Am. Soc. C. E.

to repeat details. This year has not been quite so difficult financially. The deficit of $20 000 on last year's business has been paid in full, and while a temporary loan had to be negotiated last Autumn in order to pay current bills, the amount was less than was necessary for a similar purpose in 1918.

Arrangements have been made, and will go into effect on February 1st, 1920, for a reduction in the rate of interest on the $200 000-mortgage debt on the Fifty-seventh Street property from 6% to 5%.

The Reports of the Secretary and of the Treasurer are appended.

By order of the Board of Direction,

CHAS. WARREN HUNT,
Secretary.

GENERAL BALANCE SHEET, DECEMBER 31ST, 1919.

ACCOMPANYING REPORT OF THE SECRETARY.

ASSETS.		
Three Lots (actual cost $185 406.20) Estimated Value		$350 000.00
Building		194 523.52
New Society Headquarters		5 100.00
Furniture		59 660.08
Publications on hand (inventoried cost)		22 934.56
New York City, non-taxable 4½% Bonds		10 300.00
Interest accrued on Investment		141.67
Library:		
Cash expended for books, etc.	$22 122.22	
Donations (estimated)	72 310.83	94 433.05
Equity in U. E. S. Building		486 792.79
Alfred Noble Memorial (Loan)		1 200.00
Due from Members		26 445.35
Due from Non-Members		1 230.63
Cash		27 920.65
		$1 280 682.30

LIABILITIES.		
Dues for 1920 paid in advance		$37 704.43
Mortgage		200 000.00
Interest accrued on Mortgage		5 000.00
Funds invested in Society House, Lots and Library*		29 840.78
Herbert Steward Library Fund		2 060.00
Joseph G. Swift Library Fund		1 030.00
Balance of Donation on account of work of Special Committee		2 188.03
Surplus	$995 649.06	
Reserve Fund	7 210.00	1 002 859.06
		$1 280 682.30

*Compounding Dues Fund, $13 580.00; Norman Medal Fund, $1 000.00; Rowland Prize Fund, $1 222.50; Collingwood Prize Fund, $1 000.00; Fellowship Fund, $13 038.28.

REPORT OF THE SECRETARY FOR THE

To the Board of Direction of the

Gentlemen:—I have the honor to present a statement of Receipts and Disbursements for the fiscal year of this Society, ending December 31st, 1919. I also append a general Balance Sheet showing the affairs of the Society.

Respectfully submitted,

Chas. Warren Hunt,
Secretary.

Receipts.

Balance on Hand, December 31, 1918		$31 846.75
Entrance Fees	$18 455.00	
Current Dues	95 052.18	
Past Dues	6 061.18	
Advance Dues	37 704.43	
Certificates of Membership	872.26	
Badges	4 145.13	
Sales of Publications	3 234.19	
Annual Meeting	2 070.70	
Binding	4 623.11	
Interest	765.55	
Miscellaneous	1 098.89	
Compounding Dues	1 250.00	
Rent, 220 W. 57th St	5 470.24	
Rent, Rooms 1605-1607	590.05	
Delegation to France	98.07	
Loan from C. W. Hunt	5 000.00	
		186 490.98
		$218 337.73

YEAR ENDING DECEMBER 31st, 1919.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

DISBURSEMENTS.

Salaries of Officers	$15 704.81*	
Clerical Help	27 008.62	
Publications	36 829.88	
Postage	8 998.20	
General Printing	7 439.82	
Office Supplies	2 727.62	
Badges	3 092.33	
Certificates of Membership	575.40	
Binding	5 132.49	
Reading Room Maintenance	317.14	
United Engineering Society:		
General Assessment for Space	8 318.24	
Engineering Council	4 000.00	
Library Board	5 249.98	
Employment Bureau	1 500.00	
Meetings and Miscellaneous	1 476.87	
Furniture	290.35	
Mileage of Directors	7 129.71	
Mileage of Nominating Committee	1 069.40	
Mileage of Special Committees	5 555.72	
Work of Committees	2 377.43	
Prizes	261.95	
Annual Meeting	3 177.71	
Annual Convention	939.17	
Interest on Mortgage	9 730.59	
Insurance	601.20	
Current Business	4 573.89	
Petty Expenses	46.13	
Miscellaneous	446.26	
Refunding Dues	70.40	
Delegation to France	2 128.06	
Alterations to 57th St. Building	18 647.71	
Payment of loan to C. W. Hunt	5 000.00	
		$190 417.08
Balance on hand December 31st, 1919:		
In Garfield National Bank	26 420.65	
In Hands of Secretary	1 500.00	
		27 920.65
		$218 337.73

* Secretary, $12 000; Treasurer, $100; Assistant Secretary, $4 000.

REPORT OF THE TREASURER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS FOR THE YEAR ENDING DECEMBER 31st, 1919.

In compliance with the provisions of the Constitution I have the honor to present the following report for the year ending December 31st, 1919:

Balance on Hand, December 31st, 1918		$31 846.75
Receipt from current sources, January 1st to December 31st, 1919	$181 490.98	
Temporary loan from C. W. Hunt	5 000.00	
		186 490.98
Payment of audited vouchers for current business, January 1st to December 31st, 1919	$154 542.52	
Engineering Council	4 000.00	
Library Board	5 249.98	
Employment Bureau	1 500.00	
Meetings and Miscellaneous	1 476.87	
Final Payments on account of Alterations to 57th Street Building	18 647.71	
Refund to C. W. Hunt of temporary loan	5 000.00	
Balance on Hand December 31st, 1919:		
In Garfield National Bank $26 420.65		
In Hands of Secretary 1 500.00	27 920.65	
	$218 337.73	$218 337.73

Respectfully submitted,

ARTHUR S. TUTTLE,
Treasurer.

NEW BOOKS*

(From December 1st to December 31st, 1919)

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

DONATIONS TO ENGINEERING SOCIETIES LIBRARY

ELECTRICAL ENGINEERING PAPERS:

A Collection of the Author's most Important Engineering Papers Presented before Various Technical Societies and Published in Engineering Journals and Elsewhere from Time to Time. By Benjamin G. Lamme. Westinghouse Electric & Mfg. Co., 1919. 773 pp., illus., 9 x 6 in., cloth. $2.50. (Gift of Author.)

A collection of thirty-one papers and addresses which have appeared in various periodicals during the period from 1897 to 1918. These papers deal with problems of generator and motor design, the history of direct-current generators and of street railway motors, and with technical training. The volume is published by the Westinghouse Electric and Manufacturing Company to commemorate Mr. Lamme's connection with it for thirty years.

SELENIUM CELLS:

The Construction, Care and Use of Selenium Cells with Special Reference to the Fritts Cell. By Thomas W. Benson. N. Y., Spon and Chamberlain; Lond., E. & F. N. Spon, Ltd., 1919. 63 pp., 18 illus., 8 x 5 in., cloth. $1.50.

The lack of definite information on the construction of selenium cells has led the author to publish the results of some of his experiments. After a brief review of various types of cells, the book describes in detail the manufacture, maturing, and testing of the Fritts cell, and concludes with an account of some applications and suggestions on the care of cells.

GUIDE TO THE STUDY OF THE IONIC VALVE:

Showing Its Development and Application to Wireless Telegraphy and Telephony. By William D. Owen. Lond., Sir Isaac Pitman and Sons. 59 pp., 12 illus., 6 x 4 in., cloth. $1.00.

This little volume is intended to provide, for students of radio-telegraphy, an impartial, coherent record of the development of the ionic valve. References to the original sources of the information enable the reader to pursue his study of the subject.

OIL ENGINES: DETAILS AND OPERATION.

By Lacey H. Morrison. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1919. 472 pp., illus., tab., diagrams, 9 x 6 in., cloth. $5.00.

This volume is intended for operators of oil engines. The details of construction of the more important oil engines manufactured in the United States are described and the proper methods of adjustment are explained at length.

MACHINE TOOL OPERATION:

Part I, The Lathe Bench Work and Work at the Forge. By Henry D. Burghardt. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1919. 326 pp., illus., tab., 8 x 5 in., cloth. $2.00.

The author of this work has used his experience as a teacher of machine work in a technical high school to prepare a textbook for those who desire a knowledge of the principles and elementary operations of machine shop work, suitable for use in technical and trade schools and in apprenticeship courses. While designed primarily for use in connection with lectures by an instructor, it is also useful for self-instruction.

* Unless otherwise specified, books in this list have been donated by the publishers.

ELEMENTARY PRINCIPLES OF AEROPLANE DESIGN AND CONSTRUCTION:

A Textbook for Students, Draughtsmen, and Engineers. By Arthur W. Judge. Lond. and N. Y., James Selwyn and Co., Ltd., 1919. 116 pp., 56 illus., 13 tab., 9 x 6 in., cloth. $3.00. (Gift of Isaac Pitman & Sons.)

Written to provide an inexpensive book, of an elementary nature, dealing with the fundamental principles of the design and, to a certain extent, the construction of airplanes. It follows the plan of the author's larger work, to which it may serve as an introduction.

CLAY PLANT CONSTRUCTION AND OPERATION.

By A. F. Greaves-Walker. Chicago, Brick and Clay Record, 1919. 212 pp., 79 illus., 9 x 6 in., cloth. $4.00.

In writing this work the author has attempted to explain in understandable English some of the problems of the manufacturer of structural clay products. Technical terms, formulas, and theories have been avoided, and practical facts alone are presented.

METAL WORKER'S HANDY-BOOK OF RECEIPTS AND PROCESSES:

Being a Collection of Chemical Formulas and Practical Manipulations for the Working of All the Metals and Alloys; Including the Decoration and Beautifying of Articles Manufactured Therefrom, as Well as Their Preservation. Edited by William T. Brannt. New enlarged edition. N. Y., Henry Carey Baird and Co., Inc., 1919. 582 pp., illus., tab., 8 x 5 in., cloth. $3.00.

Five new chapters have been added to the present edition of this work, describing methods for welding with the oxy-acetylene flames, thermit, and electricity, for galvanizing and for die-casting.

THE MANUFACTURE AND TESTING OF MILITARY EXPLOSIVES.

By John Albert Marshall. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1919. 261 pp., 8 x 6 in., cloth. $3.00.

This volume contains a concise account of the explosives used for military purposes, in which attention is directed to those points which have a direct bearing on the manufacture, testing, and storage of these substances. An extensive bibliography is included.

THE PETROLEUM HANDBOOK.

By Stephen O. Andros. Chic., The Shaw Publishing Co., 1919. 206 pp., illus., tab., 7 x 4 in., flexible cloth. $2.00.

In a book of pocket size, the author gives the fundamentals of each phase of the oil industry necessary to a clear understanding of the various operations entailed between the location of an oil well and the distribution of the refined products. The work is chiefly a compilation from the standard authorities, arranged for those who wish a brief, accurate account of the industry, devoid of unnecessary detail.

PRINCIPLES OF INDUSTRIAL ORGANIZATION.

By Dexter S. Kimball. 2d edition, revised and enlarged. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1919. 325 pp., 21 illus., 1 pl., 12 tab., 9 x 6 in., cloth. $3.00.

This work, the first edition of which appeared in 1913, has been written to give young engineers a concise account of the salient facts regarding the most important economic and sociological problems with which they will be brought in contact, and to explain the origin and growth of the important features of industrial organization. The present edition has been revised, re-arranged, and enlarged.

WHEN THE WORKMEN HELP YOU MANAGE.

By William R. Basset. N. Y., The Century Co., 1919. 266 pp., 7 x 5 in., cloth. $2.00.

The author states that, as a result of large practical experience, he has come to the conclusion that right relations between employers and employees depend on the establishment of arrangements by which both parties may express themselves in their work, without the intervention of outside agencies. In this book he develops certain principles underlying satisfactory relations and gives examples of their successful application by various industrial concerns.

MILLIONS FROM WASTE.

By Frederick A. Talbot. Phila., J. B. Lippincott Co.; Lond., T. Fisher Unwin, Ltd., 1920. 308 pp., 9 x 6 in., cloth. $5.00.

This work is written to indicate certain of the most obvious channels through which wealth incalculable is being permitted to escape, as well to describe some of the highly ingenious efforts which are being made to prevent this wastage. While written essentially for the uninitiated, it will, the author hopes, prove of aid to those who are fully alive to the potential values of refuse. The volume is confined to those phases of the subject which are familiar to the average person.

INDUSTRIAL RECONSTRUCTION PROBLEMS:

Complete Report of the Proceedings of the National Engineers, New York City, March 18th-21st, 1919. 197 pp., 9 x 6 in., paper.

The papers presented at the conference dealt with a wide variety of problems connected with the reorganization of our industries on a peace basis. Consideration is given to questions of finance, commerce, production, labor, education, management, etc.

TECHNO-CHEMICAL RECEIPT BOOK:

Containing Several Thousand Receipts and Processes, Covering the Latest, Most Important and Most Useful Discoveries in Chemical Technology and Their Practical Application in the Arts and the Industries. Compiled and Edited by William T. Brannt and William H. Wahl. New enlarged edition. N. Y., Henry Carey Baird and Co., Inc., 1919. 516 pp., illus., tab., 8 x 5 in. $2.50.

The principal aim in preparing this work has been to give a compendious collection of approved receipts and processes of practical applications in the industries. The receipts have been principally derived from German sources and most of them have been tested practically. The present edition has been revised and various receipts added.

TECHNISCHER LITERATURKALENDER, 1918.

München-Berlin, R. Oldenbourg. 640 columns, 1 por., 8 x 6 in., cloth. 12 marks plus 20% increase.

This volume is a concise biographical dictionary of living German authors of technical and scientific books, compiled by the Librarian of the German Patent Office. Over five thousand writers are included. The information given includes their addresses, education, age, occupations, technical specialties, publications, etc.

APPLIED SCIENCE FOR METAL WORKERS;

Applied Science for Wood-Workers. By William H. Dooley. N. Y., The Ronald Press Co., 1919. $2 each.

These volumes present a course in the general principles of science, which gives particular attention to their applications in industry and is intended for use in vocational high schools, industrial schools, apprentice classes, etc. The general scientific matter in the two books is identical. Additional material relating specifically to the wood-working trades appears in one, while the other treats of metal-working in similar fashion.

BUILDING OF THE PACIFIC RAILWAY:

The Construction Story of America's First Iron Thoroughfare between the Missouri River and California, from the Inception of the Great Idea to the Day, May 10, 1869, when the Union Pacific and the Central Pacific joined Tracks at Promontory Point, Utah, to Form the Nation's Transcontinental. By Edwin L. Sabin. Philadelphia and London, J. B. Lippincott Co., 1919. 317 pp., 10 pl., 4 por., 1 map, 8 x 5 in., cloth. $2.00.

Mr. Sabin's object has been to tell how the Pacific Railway came into being; to describe the actual building operations by which the Union Pacific Railroad, from the Missouri River, and the Central Pacific Railroad, from the Sacramento River, were constructed in six years instead of the allotted fourteen. The book is a popular, readable account of the men who built the roads and of the methods used.

STRENGTH OF MATERIALS:

A Textbook for Technical and Industrial Schools. By John Paul Kotteamp. N. Y., John Wiley and Sons, Inc.; Lond., Chapman and Hall, Ltd., 1919. 193 pp., illus., 19 tab., 8 x 5 in., cloth. $1.50.

The course of instruction presented in this textbook sets forth the fundamental principles with a minimum of mathematics, and shows the application of these principles by a large number of examples which are worked out in detail. The book is based on the author's course in the subject at Pratt Institute.

MEMBERSHIP

(From December 4th, 1919, to January 8th, 1920)

ADDITIONS

MEMBERS		Date of Membership.
ACHER, ALBERT HILANDS. Chf. Engr., U. S. Food Products Corporation, Hotel Jefferson, Peoria, Ill. (Res., 1720 Twenty-first St., N. W., Washington, D. C.)	Assoc. M. M.	April 7, 1915 Nov. 25, 1919
BERENTS, HANS. Cons. Engr., 15 Nanking Rd., Shanghai, China	Assoc. M. M.	Mar. 13, 1917 Oct. 15, 1919
BUSHNELL, HORACE LELAND. Engr. and Estimator, Grant Smith & Co., 944 Henry Bldg., Seattle, Wash		Nov. 25, 1919
BUTLER, ALFRED DICKEY. City Engr., Spokane, Wash.	Assoc. M. M.	Oct. 5, 1909 Nov. 25, 1919
CLAPPER, LELAND. Engr., Bridges and Bldgs., Duluth & Iron Range R. R., Two Harbors, Minn.	Assoc. M. M.	Aug. 31, 1915 Nov. 25, 1919
DITTOE, WILLIAM HENRY. Chf. Engr., Ohio State Dept. of Health, 8 East Chestnut St., Columbus, Ohio	Jun. Assoc. M. M.	May 3, 1910 Oct. 1, 1912 Sept. 9, 1919
FEREBEE, JAMES LUMSDEN. Prin. Asst. Engr., Milwaukee Sewerage Comm., City Hall, Milwaukee, Wis.	Assoc. M. M.	Mar. 2, 1915 Nov. 25, 1919
FOX, HERMAN HENRY. (Fox-Redpath Constr. Co.), 1012 New York Life Bldg., Kansas City, Mo.	Assoc. M. M.	Sept. 5, 1911 Nov. 25, 1919
GREEN, FREDERICK WILLIAM. Vice-Pres., St. L., S. W. Ry. Lines, 6203 Washington Ave., St. Louis, Mo.	Assoc. Assoc. M. M.	May 1, 1907 June 24, 1914 Nov. 25, 1919
HICKS, JOHN ROBERT. Engr. Dept., U. S. Coal & Coke Co., Box 161, Gary, W. Va.		Nov. 25, 1919
HODGMAN, BURT BRADLEY. Chf. Engr., National Water Main Cleaning Co., 50 Church St., New York City		Nov. 25, 1919
HOLLAND, LEON LYNWOOD. R. F. D. No. 1, Saunderstown, R. I.		Nov. 25, 1919
KNOPH, OLAF INGVALD. Cons. Engr. Münch's Gate 7, Christiania, Norway		Oct. 14, 1919
KURTZ, FORD. Res. Engr., J. G. White Eng. Corporation, 43 Exchange Pl., New York City		Nov. 25, 1919
LEE, ARTHUR CARL. Res. Engr., Southern Power Co., Charlotte, N. C.	Assoc. M. M.	Nov. 28, 1916 Nov. 25, 1919
LUKESH, GUSTAVE RUDOLF. Dist. Engr., U. S. Engr. Office, Customhouse, Charleston, S. C.		Nov. 25, 1919
LUSK, CHARLES WINSLOW. Civ. and San. Engr., Pittsburgh Filter & Eng. Co., 165 Mayer St., Oil City, Pa.	Assoc. M. M.	Oct. 1, 1913 Nov. 25, 1919

MEMBERS (*Continued*)

		Date of Membership.
MAGOR, HENRY BASIL. 115 Broadway, New York City	Jun.	April 30, 1895
	Assoc. M.	Mar. 7, 1900
	M.	Nov. 25, 1919
MERRIAM, CHARLES ALLEN. Archt. and Engr. (Doyle & Merriam), 20 Seattle National Bank Bldg., Seattle, Wash.	Assoc. M.	June 11, 1917
	M.	Nov. 25, 1919
RATHJENS, GEORGE WILLIAM. 486 Portland Ave., St. Paul, Minn.	Assoc. M.	June 4, 1913
	M.	Nov. 25, 1919
SANO, TOJIRO. Engr. in Chf., City of Kobe, Kobe, Japan	City Office,	Oct. 14, 1919
SAWYER, DONALD HUBBARD. Mgr., James Stewart & Co., Inc., Statler Hotel, Detroit, Mich.	Assoc. M.	April 6, 1909
	M.	Nov. 25, 1919
SCHULZ, EDWARD HUGH. Lt.-Col., Engrs., U. S. A., 406 Federal Bldg., Milwaukee, Wis.		Oct. 14, 1919
SCHWENDENER, KARL DEWITT. Structural Engr., 1316 Washington Bldg., Los Angeles, Cal.	Assoc. M.	April 1, 1914
	M.	Nov. 25, 1919
STIVERS, ARTHUR DUCAT. Asphalt Sales Dept., The Texas Co., 801 Fifth Ave., Fort Worth, Tex.	Assoc. M.	Sept. 12, 1916
	M.	Nov. 25, 1919
VAN RENSSELAER, ALLEN. Advisory Engr. on Water Supply, Mexican Border Project, Constr. Div., U. S. A., Box 83, Camp Travis, San Antonio, Tex.	Assoc. M.	June 24, 1914
	M.	Nov. 25, 1919
WILLIAMS, JOHN HUW. Personal Asst. to Engr.-in-Chf., and Dist. Engr., Canton-Hankow Ry., Hankow, China		Oct. 14, 1919

ASSOCIATE MEMBERS

ALLIN, RAY LESTER. Civ. and Hydr. Engr., 766 West 13th St., Oakland, Cal.	Jun.	Sept. 2, 1914
	Assoc. M.	Nov. 25, 1919
ALTHOUSE, IRVIN HENRY. Supt. and Engr., Terra Bella Irrig. Dist.; Cons. Engr., Alpaugh Irrig. Dist., Porterville, Cal.		Nov. 25, 1919
BAILHACHE, JOHN GOODIN. 478 Sutter St., San Francisco, Cal.	Jun.	Sept. 2, 1914
	Assoc. M.	Oct. 14, 1919
BAKER, WILLIAM DARTIS. Chf. Engr., Truscon Steel Co., 1258 North 57th St., Philadelphia, Pa.		Sept. 9, 1919
BARKER, EDGAR EARL. Care, Citizens Bank, Nevada City, Cal.		Sept. 9, 1919
BAXTER, WARREN GAMMELL. Cons. Engr., 1104 Turks Head Bldg., Providence, R. I.		Nov. 25, 1919
BERNSTEIN, LEO HARRY. Designer, Concrete Steel Co., 364 West 121st St., New York City		Sept. 9, 1919
BUZBY, ARTHUR DUDLEY. Asst. to Designing Engr., Chile Exploration Co., 120 Broadway, New York City		Nov. 25, 1919

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
CARRUTHERS, ROBERT BRUCE. Care, Transcontinental Oil Co., Comanche, Tex.		Nov. 25, 1919
CARSON, HARRY YOUNG. Engr., Am. Cast Iron Pipe Co., Birmingham, Ala.	Jun.	Mar. 14, 1916
	Assoc. M.	Oct. 14, 1919
COFFMAN, CLYDE DANIEL. 337 Fernwood Drive, Akron, Ohio		Mar. 11, 1919
COMBS, CLAUDE ARTIST. Asst. Engr. on Constr., A., T. & S. F. System, 612 Harrison St., Porterville, Cal.		Nov. 25, 1919
DE JONGH, ARTHUR FRANCIS. Care, Banco de Fomento, Santiago de Cuba, Cuba.	Jun.	Dec. 3, 1912
	Assoc. M.	Sept. 9, 1919
DOW, EDWIN ARTHUR. Asst. Hydr. Engr., Power Constr. Co., 35 Harvard St., Worcester, Mass.	Jun.	Oct. 31, 1911
	Assoc. M.	Oct. 14, 1919
ELLIS, RICHARD. Chf. Designer, Lockwood, Greene & Co., 245 State St., Boston (Res., 448 Broadway, Cambridge), Mass.		June 16, 1919
FOGG, RALPH JUSTIN. Head, Civ. Eng. Dept., Lehigh Univ., South Bethlehem, Pa.		Nov. 25, 1919
FONTAINE, JOHN EATON. Chf. of Party and Res. Engr., Morgan Eng. Co., 622 Goodwyn Inst., Memphis, Tenn.		Nov. 25, 1919
GARLAND, ELDON ADDISON. Chf. Engr., Doheny Oil & Ranch Co. (Ranch Div.), 1202 Garden St., Santa Barbara, Cal.		Nov. 25, 1919
GREEN, ROY MELVIN. Prof. of Highway Eng., Agricultural and Mech. Coll. of Texas, College Station, Tex.		Nov. 25, 1919
GREENLEAF, DONALD LEAL. With Coke Dept., Wisconsin Steel Co., South Chicago (Res., 5463 Blackstone Ave., Chicago), Ill.		Nov. 25, 1919
HART, ARTHUR JOHN. Chf. Representative Engr. in Australia, The Indented Bar & Concrete Eng. Co., Ltd., 375 George St., Sydney, New South Wales, Australia.		Oct. 14, 1919
HAY, WILLIAM WREN. New York Mgr., Les Etablissements, A. W. Pidwell of Paris, France, 137 Fife St., Forest Hills, N. Y.		Oct. 14, 1919
HAYNES, HARWOOD SYME. 210 McIver St., Greensboro, N. C.		June 16, 1919
HAYS, JAMES BUCHANAN. (Hays, Sloan & Lewis), 306 Boise City National Bank Bldg., Boise, Idaho.	Jun.	Oct. 1, 1913
	Assoc. M.	Nov. 25, 1919
HEIDEL, CHARLES SUMNER. Hydrographer, Montana State Engr.'s Office, 608 North Davis St., Helena, Mont.	Jun.	July 2, 1913
	Assoc. M.	Oct. 14, 1919
HERMAN, RALPH EMERSON, JR. Care, C., M. & St. P. R. R., 421 Wells Fargo Bldg., San Francisco, Cal.		April 14, 1919
JONES, ALFRED. Chf. Deputy County Surv., Los Angeles County, 702 Hall of Records, Los Angeles, Cal.		Nov. 25, 1919

ASSOCIATE MEMBERS (*Continued*)

	Date of Membership.
KIEL, FRANK BURDETTE. (Bird & Kiel), 43 Moore & Turner Bldg., Little Rock, Ark	Nov. 25, 1919
KING, FRANK ELMER. Mgr., New York Office, Pittsburgh Bridge & Iron Works, 2 Rector St., Room 1426, New York City (Res., 20 Hillside Ave., Newark, N. J.)	Nov. 25, 1919
LETTS, JOSEPH CLINTON. Capt., Engrs., U. S. A., U. S. Gen. Hospital No. 41, Fox Hills, N. Y.	Nov. 25. 1919
MCCARTHY, JUSTIN CHARLES. 183 West 87th St., New York City	Nov. 25, 1919
MALVIG, AXEL OSVALD. Y. M. C. A., Detroit, Mich	Nov. 25, 1919
MARTINEZ, ROLANDO ARNOLDO. With Havana Sewer and Paving Dept.; Cons. Engr., Obispo 59, Havana, Cuba — Jun.	Dec. 1, 1908
MARTINEZ, ROLANDO ARNOLDO. With Havana Sewer and Paving Dept.; Cons. Engr., Obispo 59, Havana, Cuba — Assoc. M.	Nov. 25, 1919
MILLER, WALTER SCOTT. Asst. Engr., Meigs, Simon & Fearing, Pennsylvania Bldg., Philadelphia (Res., Parkland), Pa	Nov. 25, 1919
MILLER, WILLIAM AITKEN. Lecturer in Civ. Eng., P. N. Russell School of Eng., Univ. of Sydney, Sydney, New South Wales, Australia	Sept. 9, 1919
MYERS, RICHARD AUSTIN. Care, South-Eastern Underwriters Assoc., Atlanta, Ga	Nov. 25, 1919
NEELY, MARVIN YOUNG. Hydr. Engr., Birkinbine Eng. Offices, 4628 Spruce St., Philadelphia, Pa	Nov. 25, 1919
NICKEY, EMIT COIN. Highway Engr. and County Surv., Butler County, Court House, Poplar Bluff, Mo	Nov. 25, 1919
NIXON, HARRY STILLWELL. Asst. Engr., U. P. R. R., Room 1007, Union Pacific Headquarters Bldg., Omaha, Nebr	Oct. 14, 1919
ORR, NEWELL HAMILTON. Asst. Engr., Erecting Dept., Am. Bridge Co., 1526 Frick Bldg., Pittsburgh, Pa	Nov. 25, 1919
PHILLIPS, JOHN MARCH. Res. Engr., Clyde Potts, Lathrop Ave., Boonton, N. J	Nov. 25, 1919
POLANSKY, THEODORE ARTHUR. Field Constr. Engr., Portland Cement Assoc., 408 Union Trust Bldg., Parkersburg, W. Va	Nov. 25, 1919
RANDALL, ROBERT HENRY. Cons. and Contr. Engr. (R. H. Randall & Co.), 1250 Nicholas Bldg., Toledo, Ohio	Nov. 25, 1919
ROBERTSON, FONZIE EUGENE. Archt. and Structural Engr. (Taylor, Robertson & Griesenbeck), Southwestern Life Bldg., Dallas, Tex — Jun.	June 11, 1917
ROBERTSON, FONZIE EUGENE. Archt. and Structural Engr. (Taylor, Robertson & Griesenbeck), Southwestern Life Bldg., Dallas, Tex — Assoc. M.	Nov. 25, 1919
ROSENWALD, JESSE. With Maurice C. Couchot, 1560 Sacramento St., San Francisco, Cal	Nov. 25, 1919
ROSS, WILLIAM CLAIBORNE. Hazen, Ark	Nov. 25, 1919

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
SCHNABEL, WILLIAM CHARLES. Cons. Engr., 3016 Hartford Rd., Baltimore, Md.		Nov. 25, 1919
SCHUYLER, WALTER WESLEY. Supt. of Agriculture, United Fruit Co., Preston Div., Guaro, Oriente, Cuba.	Jun.	May 6, 1914
	Assoc. M.	Nov. 25, 1919
SHLESSINGER, JACOB. Junior Engr., U. S. Engr. Office, 2798 West North Ave., Baltimore, Md.		Nov. 25, 1919
SIEMS, VALENTINE BERNARD. Prin. Asst. Engr., Baltimore City Water Dept., Eng. and Constr. Div. (Res., 710 East 33d St.), Baltimore, Md.		Nov. 25, 1919
SINGH, KIRPAL. Sub-divisional Officer, Canal Dept., Irrig. Branch, Punjab Upper Chanab Canal, Jethuwal, Amritsar, India.		June 16, 1919
SPEAR, WILLIAM HOWARD. Res. Engr., W. M. Ledbetter & Co., 601 Pacific Elec. Bldg., Los Angeles, Cal.		Nov. 25, 1919
STANTON, WILLIAM MACY. Senior Progress Engr., Office of the Vice-Pres., U. S. Shipping Board, Emergency Fleet Corporation, Philadelphia (Res., 85 North Lansdowne Ave., Lansdowne), Pa.		Nov. 25, 1919
STRATTMAN, CHARLES ROBERT. 405 Chickasaw Ave., Bartlesville, Okla.		Nov. 25, 1919
SYLLIAASEN, MELVIN OLIVER. Structural Plan Checker, Seattle Bldg. Dept., 510 County City Bldg. (Res., 907 West Howe St.), Seattle, Wash.	Jun.	Feb. 4, 1914
	Assoc. M.	Nov. 25, 1919
TSAI, PING YE. Asst. Engr., Chinese Govt. Rys., Care, Chuchow-Chinchow Ry., Peking, China.		Oct. 14, 1919
UNGER, WILLIAM LOUIS. Bridge Designer, N. Y. C. R. R., Office of Engr. of Structures, 540 Lexington Ave., Room 631, New York City (Res., 144 One hundred Forty-fourth St., Jamaica, N. Y.)	Jun.	Oct. 7, 1914
	Assoc. M.	Nov. 25, 1919
WALKER, EDSON OZRO. Mgr., Chicago Dist., Concrete Eng. Co., 140 South Dearborn St., Chicago, Ill.		Nov. 25, 1919
WARREN, ALBERT KENDALL. Senior Engr. and Deputy County Surv., 702 Hall of Records, Los Angeles, Cal.		Nov. 25, 1919
WHITAKER, RALPH WARREN. City Engr. and Supt. of Streets, City Hall, Bakersfield, Cal.		Nov. 25, 1919
WICKHAM, JAMES THOMAS. Lieut., Royal Engrs., Mount Folly, Wexford, Ireland.		Nov. 25, 1919
WILLEY, LEO CECIL. 1455 Leavenworth Ave., Apartment 6, San Francisco, Cal.		Nov. 25, 1919
WILSON, HARRY KEITH. 31 Prospect St., East Orange, N. J.		Nov. 25, 1919
WITT, ROBERT EURBANK. Prof., Civ. Eng., Univ. of Detroit, 491 Jefferson Ave., East, Detroit, Mich.		Nov. 25, 1919

ASSOCIATE MEMBERS (*Continued*)	Date of Membership.
WOLFE, WALTER MCILHANEY. Contr. Engr., North-Eastern Constr. Co., Gen. Delivery, Aberdeen, Md.	Nov. 25, 1919
YOUNG, STELL KAY. Secy. and Asst. Chf. Engr., Miami Conservancy Dist., Care, Conservancy Office, Kenton, Ohio.	Nov. 25, 1919
ASSOCIATES	
HUNT, HARRY HAUVER. Gen. Contr. (Grant Smith & Co.), 619 Fernwell Bldg., Spokane, Wash.	Nov. 25, 1919
JUNIORS	
CHRISTIAN, VALENTINE. 312 Union Ave., Rutherford, N. J.	Nov. 25, 1919
HENRY, JOHN BERNARD. Supt., Imperial Water Co. No. 3, Calipatria, Cal.	Nov. 25, 1919
JOHNSON, DAVID TERRILL. 2d Lieut., Engrs., U. S. A., The Engr. School, Camp A. A. Humphreys, Va.	Nov. 25, 1919
KINCH, MASON HILL. Office Engr., State of Illinois Dept. of Public Works and Bldgs., Div. of Highways, 302 Apollo Theatre Bldg., Peoria, Ill.	Nov. 25, 1919
KRAMER, HANS. Capt., Corps of Engrs., U. S. A., The Engr. School, Camp A. A. Humphreys, Va.	Nov. 25, 1919
MCCURDY, BYRON CASPER. Turrel, Ark.	June 16, 1919
NICHOLS, MARVIN CURTIS. Rockwall, Tex.	Nov. 25, 1919
PACE, RAGSDALE. Gen. Supt. and Designer, B. F. & C. M. Davis, 407 Reynolds Bldg., Fort Worth, Tex.	Nov. 25, 1919
STOCKWELL, HARRY DAVID. Chf. Surv., Operating Dept., Braden Copper Co., Sewell, Rancagua, Chile.	Oct. 14, 1919

RESIGNATIONS

MEMBERS	Date of Resignation.
ASHTON, WILLIAM.	Dec. 31, 1919
BENEDICT, HERSCHEL ALBERT.	Dec. 31, 1919
FELLOWS, ABRAHAM LINCOLN.	Dec. 31, 1919
GARLINGHOUSE, FREDERICK LEMAN.	Dec. 31, 1919
HUNTER, JOHN BULNAP.	Dec. 31, 1919
POLLEYS, WILLIAM VAUGHAN.	Dec. 31, 1919
RICHARDS, ALBERT LENNOX.	Dec. 31, 1919
SHANNAHAN, JOHN NEWTON.	Dec. 31, 1919
YUILLE, NATHANIEL ALSTON.	Dec. 31, 1919
ASSOCIATE MEMBERS	
ADAMS, EDWARD MAGUIRE.	Dec. 31, 1919
BANKS, GEORGE HILL.	Dec. 31, 1919
BECK, ALFRED FORTIN.	Dec. 31, 1919
CLOUGH, ALBERT HASKELL.	Dec. 31, 1919

ASSOCIATE MEMBERS (*Continued*)	Date of Resignation.
Cook, Richard Bailey	Dec. 31, 1919
Day, Warren Ellis	Dec. 31, 1919
DeLamere, Charles Thomas	Dec. 31, 1919
Edmondson, Ralph Seldon	Dec. 31, 1919
Evans, John Maurice	Dec. 31, 1919
Fain, James Rhea	Dec. 31, 1919
Ferguson, Wilbur Earle	Dec. 31, 1919
Goodman, Leon	Dec. 31, 1919
Green, Arthur Brooks	Dec. 31, 1919
Harrington, Harry Garfield	Dec. 31, 1919
Harris, Frank Sampson Mason	Dec. 31, 1919
Herkness, Lindsay Coates	Dec. 31, 1919
Johnstone, William Bard	Dec. 31, 1919
Keith, Charles Whiteside	Dec. 31, 1919
Kelley, Matthew DeTobin	Dec. 31, 1919
King, Eric Tube	Dec. 31, 1919
Kingsley, Edgar Albert	Dec. 31, 1919
Lee, Charles Henry	Dec. 31, 1919
Leeds, Livingston Allaire	Dec. 31, 1919
Nabstedt, Arthur Theodore	Dec. 31, 1919
Newton, Jewett Beach	Dec. 31, 1919
Patterson, Laurence	Dec. 31, 1919
Rowe, Wilfred Lincoln	Dec. 31, 1919
Stewart, Benjamin Franklin, Jr	Dec. 31, 1919
Swickard, Andrew	Dec. 31, 1919
Trow, Frank Hamant	Dec. 31, 1919
Wells, Walter Melvin	Dec. 31, 1919
Wiggins, Ralph Raymond	Dec. 31, 1919
Wilson, Harry Percival	Dec. 31, 1919
ASSOCIATES	
Irwin, William Clark	Dec. 31, 1919
JUNIORS	
Brown, Harry Madara	Dec. 31, 1919
Burr, George Lindsley	Dec. 31, 1919
Darville, Merton Arthur	Dec. 31, 1919
Elliott, Percival	Dec. 31, 1919
Feiner, Mark Antony	Dec. 31, 1919
Gambier-Bousfield, George Edmund	Dec. 31, 1919
Howard, Gerald Branch	Dec. 31, 1919
Morrow, Clarence Edgar	Dec. 31, 1919
Mudd, John Posey	Dec. 31, 1919
Rader, James Wilson	Dec. 31, 1919
Rosenfeld, James Roy	Dec. 31, 1919
Swigart, Clyde Arthur	Dec. 31, 1919

DEATHS

ARCHER, WILLIAM. Elected Member, March 2d, 1881; died November 24th, 1919.

BROWN, STEPHEN PEARSON. Elected Associate Member, October 5th, 1904; Member, November 1st, 1910; died December 6th, 1919.

HIMES, ALBERT JAMES. Elected Associate Member, November 6th, 1895; Member, June 7th, 1899; died November 3d, 1919.

HODGE, HENRY WILSON. Elected Junior, January 5th, 1887; Member, October 2d, 1895; died December 21st, 1919.

HUNTINGTON, LINN MURDOCH. Elected Junior, May 2d, 1905; Associate Member, August 31st, 1909; Member, December 31st, 1913; died November 24th, 1919.

KING, PAUL SOURIN. Elected Member, July 3d, 1889; died October 30th, 1919.

NEWBROUGH, WILLIAM. Elected Member, April 6th, 1904; died November 1st, 1919.

O'DONNELL, JOHN PATRICK. Elected Member, July 5th, 1893; died December 2d, 1919.

SMEAD, RAPHAEL CHART. Elected Member, February 1st, 1905; died November 28th, 1919.

STEARNS, FREDERIC PIKE. (*Past-President.*) Elected Member, October 2d, 1878; died December 1st, 1919.

STRONG, MASON ROMEYN. Elected Member, March 6th, 1901; died December 2d, 1919.

VAN BUREN, ROBERT. Elected Member, June 17th, 1868; died December 16th, 1919.

Total Membership of the Society, January 8th, 1920, 9 417.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(November 22d to December 22d, 1919)

NOTE.—*This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

(2) *Journal*, Engrs. Club of Phila., Philadelphia, Pa.
(3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
(4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
(5) *Journal*, Eng. Inst. of Canada, Montreal, Que., Canada.
(6) *Journal*, Am. Inst. of Archts., Washington, D. C., 50c.
(7) *Gesundheits Ingenieur*, Munich, Germany.
(8) *Stevens Indicator*, Hoboken, N. J., 50c.
(9) *Industrial Management*, New York City, 25c.
(11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
(12) *The Engineer* (London), International News Co., New York City, 35c.
(13) *Engineering News-Record*, New York City, 15c.
(15) *Railway Age*, New York City, 15c.
(16) *Engineering and Mining Journal*, New York City, 15c.
(17) *Electric Railway Journal*, New York City, 10c.
(18) *Railway Review*, Chicago, Ill., 15c.
(19) *Scientific American Supplement*, New York City, 10c.
(20) *Iron Age*, New York City, 20c.
(21) *Railway Engineer*, London, England, 1s. 2d.
(22) *Iron and Coal Trades Review*, London, England, 6d.
(24) *American Gas Engineering Journal*, New York City, 10c.
(25) *Railway Mechanical Engineer*, New York City, 20c.
(26) *Electrical Review*, London, England, 4d.
(27) *Electrical World*, New York City, 10c.
(28) *Journal*, New England Water-Works Assoc., Boston, Mass., $1.
(29) *Journal*, Royal Soc. of Arts, London, England, 6d.
(32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
(33) *Le Génie Civil*, Paris, France, 1 fr.
(36) *Cornell Civil Engineer*, Ithaca, N. Y.
(40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pfg.
(41) *Elektrotechnische Zeitschrift*, Berlin, Germany.
(42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, $1.
(43) *Annales des Ponts et Chaussées*, Paris, France.
(45) *Coal Age*, New York City, 15c.
(46) *Scientific American*, New York City, 15c.
(47) *Mechanical Engineer*, Manchester, England, 3d.
(48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60 m.
(49) *Zeitschrift für Bauwesen*, Berlin, Germany.
(50) *Stahl und Eisen*, Düsseldorf, Germany.
(53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten-Verein, Vienna, Austria, 70h.
(54) *Transactions*, Am. Soc. C. E., New York City, $16.
(55) *Mechanical Engineering*: Journal, Am. Soc. M. E., New York City, 35c.
(56) *Transactions*, Am. Inst. Min. and Metallurgical Engrs., New York City, $6.
(57) *Colliery Guardian*, London, England, 5d.
(58) *Proceedings*, Engrs.' Soc. of W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
(59) *Proceedings*, American Water Works Assoc., Troy, N. Y.
(60) *Municipal and County Engineering*, Indianapolis, Ind., 25c.
(61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
(62) *American Drop Forger*, Thaw Bldg., Pittsburgh, Pa., 10c.
(63) *Minutes of Proceedings*, Inst. C. E., London, England.
(64) *Power*, New York City, 10c.
(65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
(66) *Gas Journal*, London, England, 6d.
(67) *Cement and Engineering News*, Chicago, Ill., 25c.
(69) *Eisenbau*, Leipzig, Germany.
(71) *Journal*, Iron and Steel Inst., London, England.
(71*a*) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.

(72) *American Machinist*, New York City, 15c.
(73) *Electrician*, London, England, 18c.
(75) *Proceedings*, Inst. of Mech. Engrs., London, England.
(77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
(78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
(80) *Tonindustrie Zeitung*, Berlin, Germany.
(83) *Gas Age*, New York City, 15c.
(85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
(86) *Engineering and Contracting*, Chicago, Ill., 10c.
(87) *Railway Maintenance Engineer*, Chicago, Ill., 10c.
(88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
(89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., $5.
(90) *Transactions*, Inst. of Naval Archts., London, England.
(91) *Transactions*, Soc. of Naval Archts. and Marine Engrs., New York City.
(92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
(93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
(96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
(98) *Journal*, Engrs. Soc. of Pa., Harrisburg, Pa., 30c.
(99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, $2.
(100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
(103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
(104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
(105) *Chemical and Metallurgical Engineering*, New York City, 25c.
(106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
(107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
(109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
(111) *Journal of Electricity*, San Francisco, Cal., 25c.
(113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.
(114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.
(115) *Journal*, Engrs.' Club of St. Louis, St. Louis, Mo., 35c.
(116) *Blast Furnace and Steel Plant*, Pittsburgh, Pa., 15c.
(117) *Engineering World*, Chicago, Ill.
(118) *Times Engineering Supplement*, London, England, 2d.
(119) *Landscape Architecture*, Harrisburg, Pa., 50c.
(120) *Automotive Industries*, New York City, 15c.
(121) *Proceedings*, Am. Concrete Inst., Boston, Mass.

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Notes on the Activated-Sludge Plants at Houston, Texas. (13) Dec. 11–18.
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Kleiderablagen und Waschgelegenheiten in gewerblichen Betrieben.* Emele. (40) May 16, 1917.

Structural.

Chicago & Northwestern Ry. Co. Terminal Grain Elevator.* W. H. Finley. (4) May.
Highest Chimney Built for Smelter.* (13) Oct. 23.
Criticism of the Ordinary Methods of Designing Reinforced Concrete Beams.* James W. Pearl. (86) Nov. 26.
Electrolysis of Concrete.* (From paper issued by Bureau of Standards.) (86) Nov. 26.

* Illustrated.

Roads and Pavements.—(Continued).

Asphaltic Oil for Dirty Pavements.* Allen O. Pinkham. (Eng. Rec., Dec. 6, 1919: 662.)

Characteristics of Pavement Types and Conditions Affecting a Choice in Kansas Cities. A. P. Learned. (Eng. Rec., Nov. 1, 1919: 467.)

Success of Asphalt Penetration-Filler by Vertical-Fiber Brick Treatments. Clark R. Mollenhoff. (Penn. Engr. read before Am. Soc. for Municipal Improvements, 1919: Nov.)

New Type of Wood and Asphalt Flooring for Chicago Bridges.* A. H. Agnew. (Eng. Rec., Nov. 15: 525.)

The Relative Advantages of Sheds and Double Car Floor Servicing Work. (Serial Data in Brevity. Extracts from Tar Composite.) (Eng. Rec., Nov. 22: Central Concrete Pavements in New England and the United States and Canada. A. Taylor. (Eng. Rec., Nov. 22: 111.)

Asphalt Impregnation (Bituminous) Roads and Their Extension (Pa. T.-Washington. (Paper read before County Chemists Assoc.) (Eng. Rec., Nov. 22: (117.)

Concrete and Its Uses in Town Road Surface Before Office.* W. A. Webb. (Eng. Rec., Nov. 22: Dec. 6.

Reinforced Concrete Roads Their Construction, Maintenance and Use.* W. Matthews. (Paper read before County Chemists Assoc.) (Eng. Rec., Nov. 29: The Present Status of Impact Tests on Bituminous Surfaces.* A. T. Goldbeck. (Paper read before National Highway Traffic Assoc.) (Eng. Rec., Dec. 13: Dec. 6.

Status of Construction Materials in Province of Quebec. A. Taschereau. (Address before Assoc. of Quebec Roads Engineers and Good Roads Assoc.) (Eng. Rec., Dec. 6.

Recent Developments in Concrete Highway Construction.* A. N. Johnson. (Paper read before Am. Soc. for Municipal Improvements.) (Eng. Rec., Dec. 6: Nov. 29.

Solving Snow Problem on Highways.* (Eng. Rec., Dec. 6.

Capacity Load and Traffic Grade in Highway Transportation.* H. C. Haines. (Eng. Rec., Dec. 6.

Road, Street and Road Construction. Will P. Blair. (Paper read before Am. Soc. for Municipal Improvements.) (Eng. Rec., Dec. 6.

Why Pittsburgh Demolishes Its Municipal Bridges.* Irving W. Patterson. (Eng. Rec., Dec. 13: 12.

Sanitation.

Sewerage, Sanitation and Drainage at U. S. Army Camps.* Leonard B. Dodge. (Eng. Rec., Nov. 1.

Flood Protection and Drainage at East St. Louis, Ill.* (Eng. Rec., Dec. 20: May 6.

Sewage Treatment Plant at Northville, Mich.* J. H. Dodge. (From The Trades.) (Eng. Rec., Dec. 6.

Recovery of Valuable Constituents of Garbage.* Samuel A. Greene. (Paper read before Am. Soc. for Municipal Improvements.) (Eng. Rec., Dec. 27: Dec. 6.

Determination of Nitrate's Importance in a Drinking Dilute.* Hugh Bunnet. (Eng. Rec., Nov. 29: Dec. 6.

Treatment of Gas Waste in Bryson Water Pollution.* E. J. Tully. (Eng. Rec., Dec. 27-Dec. 6.

Renewable Valves in Sewage and Sewage Sludge. (Engineering World. (Paper read before Am. Soc. of Municipal Improvements.) (Eng. Rec., Dec. 6.

Results of 1918 Operations of Typical Plants of Milwaukee Sewerage Commission.* (Eng. Rec., Dec. 13.

Disposal of Night-Soil, Sewage and Garbage in Rural Districts. (Abstract of Report of Committee on Sewerage and Sewage Disposal read before Am. Public Health Assoc.) (Eng. Rec., Dec. 13.

Present Status of the Bowers Disposal Problem. George O. Zimpel. (Eng. Rec., Dec. 13.

Earth Slope Form Dissatisfies to Open-Cut Sewers.* (Eng. Rec., Dec. 13-13.

Notes on the Activated-Sludge Plants at Houston, Texas. (Eng. Rec., Dec. 13-13.

Treatment of Canning-House Wastes in Wisconsin.* E. J. Tully. (Eng. Rec., Dec. 13-13.

Reinigungsanlage und Verschlammung der Abwässer in Schwebefilter Verfahren.* Imhoff. (Eng. Rec., Dec. 20: 1912.

Structural.

Chicago & Northwestern Ry. Co. Terminal Grain Elevator.* W. H. Finley. (Eng. Rec., May.

Flatbed Conveyor Built for Needle.* (Eng. Rec., Dec. 13.

Cutting of the Ordinary Methods of Designing Reinforced Concrete Beams.* James W. Tratt. (Eng. Rec., Nov. 29.

Electrolysis of Concrete.* (From paper issued by Bureau of Standards.) (Eng. Rec., Nov. 29.

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* Illustrated.

Structural—(Continued).

Analysis of Concrete-Proportioning Theories.* Roderick B. Young. (96) Nov. 27.
Concrete Arched Beams and Open Girder Carry Roof of Toronto Theater.* (From *Contract Record.*) (86) Nov. 26; (117) Dec. 15.
Broader Use of Johnson's Formula for Repeated Stresses.* J. B. Kommers. (13) Nov. 27-Dec. 4.
Diagrams for Reactions and Bending Moments of Beams.* Raymond Burnham. (13) Nov. 27-Dec. 4.
Concrete Construction on the Mississippi Sands.* Rozel Gotthold. (46) Nov. 29.
Architectural Acoustics. Clifford M. Swan. (6) Dec.
Electrolysis in Concrete. E. B. Rosa, Burton McCollum and O. S. Peters. (117) Dec. 15.
Planning Construction of Gypsum.* Curtis F. Columbia. (117) Dec. 15.
Sliding Forms for Monolithic Concrete Construction.* (117) Dec. 15.
Stallbauten aus Eisenbeton beim Neubau des Vieh-und Schlachthofes zu Dresden im Jahre 1907.* Wilhelm Iwand. (78) May 3, 1916.
Ein System rationeller Eisenwirtschaft. Paul Frei. (78) May 3, 1916.
Versuche über die Wasserdurchlässigkeit von Kiesbeton.* O. Withey. (78) May 3, 1916.
Die Befestigung von Transmissionen usw. in Betonbauten.* (78) May 3, 1916.
Neuere Bauten von Emanuel v. Seidl. (Zoological Garden at Munich.) (40) Sept. 30, 1916.
Das Verhalten weicher Bedachungsarten im Feuer. (40) Oct. 11, 1916.
Säulenversuche mit exzentrischer Belastung, ausgeführt von C. Bach und O. Graf, Stuttgart.* (78) Serial beginning Nov. 3, 1916.
Rechnerische Ermittlung des maximalen Feldmoments bei kontinuierlichen und Konsolträgern.* Ad. Hofbauer. (78) Nov. 3, 1916.
Besondere Bedingungen für die Vergebung von Eisenbetonarbeiten.* Karl Böhm-Gera. (78) Nov. 3, 1916.
Dampframme für geschüttete Betonpfähle.* H. Hermanns. (40) Nov. 11, 1916.
Kreisringförmige Eisenbetonquerschnitte unter exzentrischem Druck.* R. E. Steinsberg. (78) Serial beginning Dec. 4, 1916.
Kranbahn in Eisenbeton.* A. Marx. (78) Dec. 4, 1916.
Die Knickkraft eines Stabes mit elastischer Querstützung.* E. Elwitz. (40) Serial beginning Dec. 6, 1916.
Stampfbeton und Gussbeton. Karl Reinbold. (80) Dec. 9, 1916.
Vom Wesen des Schaubildes.* Schlemm. (40) Mar. 28, 1917.
Ueber eine neue Berechnung der Spannungsverteilung in zylindrischen Behälterwänden.* Wilh. Effenberger. (78) Apr. 4, 1917.
Ein logischer Fehler in der Formel für die umschnurten Säulen. (78) Apr. 4, 1917.
Neubau eines Fabrik- und Magazingebäudes für die Hansa Lloyd Werke A.-G. in Bremen.* R. w. G. Schellenberger. (78) Apr. 4, 1917.
Betonversuche zur Feststellung der Eignung von Granitgrus als Zuschlagstoff an Stelle von Sand. Schaper. (40) Apr. 7, 1917.
Neue städtische Schulbauten in Schwerin i. M.* Dewitz. (40) Serial beginning Apr. 7, 1917.
Beschädigung von Bauwerken durch Grund- und Sickerwasser und von Tunnelmauerwerk durch die Rauchgase. Kommerell. (40) May 12, 1917.
Ungünstigste Stellung eines Lastenzuges und grösstes Biegungsmoment des Balkens auf zwei Stützen.* (40) May 16, 1917.
Druckfestigkeiten von Betonmischungen aus verschiedenen Zuschlagstoffen. G. Mahir. (40) May 19, 1917.
Der Ausbau der evangelischen Lehrerbildungsanstalt in Esslingen am Neckar.* Heess. (40) Serial beginning May 26, 1917.
Berechnung der Säulen aus umschnürtem Gusseisen.* Max R. v. Thullie. (78) June 4, 1917.
Ueber exzentrische Fundamente (sogenannte Stiefelfundamente).* A. Fruchthändler. (78) June 4, 1917.
Neuere amerikanische Versuche mit trägelosen Decken.* J. Polivka. (78) Serial beginning June 4, 1917.
Beitrag zur Berechnung der Schiefen Zugkräfte am Auflager des Eisenbetonbalkens bei wandernden Einzellasten.* Franz Meyer (78) June 4, 1917.
Turnhalle der Mädchen-Mittelschule in Löwenberg i. Schl.* Wilhelm Iwand. (78) June 4, 1917.
Zur Beurteilung und Untersuchung beschädigten Zementbetons. F. Hart. (40) June 6, 1917.
Das Kaiser-Wilhelm-Haus für Kriegsbeschädigte im Langenbeckhause in Berlin.* M. Guth. (40) June 6, 1917.
Steingrus als Betonzuschlag an Stelle von Sand. Draesel. (40) June 16, 1917.
Sicherungmassnahmen in Lichtspielhäusern.* Wendt. (40) June 27, 1917.
Theorie der gleichmässig elastisch gestützten Körper.* A. Freund. (78) Serial beginning July 3, 1917.

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* Illustrated.

Structural—(Continued).

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Fest- und Turnhalle der Stadt Schweidnitz i. Schles.* Viktor Neumann. (78) Serial beginning July 3, 1917.
Auflasten bei Erddruckermittlungen.* Max Buchwald. (40) July 4, 1917.
Durchbiegung eines Trägers unter bewegter Last. H. Zimmermann. (40) July 7, 1917.
Beschädigung von Bauwerken durch sulfathaltige Wässer. Hermann Passou. (40) July 7, 1917.
Kleine türkische Bauten in der südlichen Dobrudscha.* Rudolf Bernhard. (40) July 7, 1917.
Richtpunkte für das Entwerfen von Kleinwohnungsbauten. (40) Serial beginning Aug. 18, 1917.
Ueber Versuche mit Steinerhaltungsmitteln.* F. Rathgen. (49) Pt. 7.
Die Berechnung von Bohlwänden nach der Elastizitätslehre.* A. Freund. (49) Pt. 7.
Zur Frage der Knickbeanspruchung biegungsstiefer Fachwerkstäbe.* H. Müller-Breslau. (40) Jan. 4.
Unfallstatistik des Deutschen Ausschusses für Eisenbeton 1911 bis 1918. W. Petry. (78) Serial beginning May 5.
Entwurf zu einer Bauordnung. (40) May 21.
Entwurfsgrundlagen für zweistielige Bogenhallenbinder mit Zugband. Otto Fröhlich. (78) June 4.
Neuere Ausführungen der trägerlosen Decken (Pilzdecken), besonders in Amerika.* J. Polivka. (78) Serial beginning June 4.
Holz und Schilf als Ersatz des Eisens in der Zugbewehrung.* Emperger. (78) Serial beginning June 4.
Musterbeispiele zu den Bestimmungen für Ausführung von Bauten aus Eisenbeton vom 13. Januar 1916.* (40) June 11.
Notstandverträge mit veränderlichen Einheitspreisen im Eisenbau. Freund. (40) June 14.
Ueber Knickfestigkeit.* H. Müller-Breslau. (40) July 2.
Fabrikneubauten in Eisenbeton für die Fahrräder-Motorwagen- und Flugzeugmotoren-Fabrik Adam Opel-Rüsselsheim.* Hans Schäfer. (78) July 4.
Fussböden in gewerblichen Betrieben. Eduard Emele. (40) July 9.
Zwei neue Kleinwohnungsanlagen in München. Theodor Fischer. (40) Serial beginning Aug. 20.
Die Standfestigkeit von Hallenwänden gegen Winddruck.* Th. Gesteschi. (40) Aug. 27.
Die Ausstellung für Wohnungsbau in Dresden 1919.* (40) Aug. 30.
Ueber den Einfluss des Wasserauftriebs auf die Standfestigkeit der Bauwerke.* Friedrich Engesser. (40) Serial beginning Sept. 3.
Der Hohlsteinbau aus *m*-Steinen.* F. Emperger (78) Sept. 4.
Statische Berechnung eines Pfahlbündels.* R. Preuss. (78) Sept. 4.
Arbeiterbaracken in den Niederlanden.* Hartleb. (40) Sept. 10.
Kleine Wohnhäuser.* (107) Serial beginning Oct. 18.
Ueber Wärmeschutz von Gebäuden und die Wärmehaltung verschiedener Baustoffgefüge. E. Schulthess. (107) Oct. 25.
Zur allgemeinen Organisation der Hochbau-Kostenvoranschläge und Abrechnungen. Jos. Erne. (107) Nov. 15.

Topographical.

Report of the International Alaska-Yukon Boundary Commission.* J. J. McArthur. (5) Dec.
Die Raumbildmessung.* Otto Lacmann. (40) Serial beginning Aug. 2.

Water Supply.

Effect of Metering on Water Consumption.* H. P. Matte. (4) Mar.
Determination of Water-Supply from Snow Fields.* J. E. Church, Jr., and A. L. Smith. (13) Oct. 23.
New Type of Thin-Wall Cofferdam.* (13) Oct. 30-Nov. 6.
Sanitary Effect of Water Storage in Open Reservoirs.* Abel Wolman and S. T. Powell. (13) Oct. 30-Nov. 6.
Templet Used in Clearing Sand from Irrigation Canals. (13) Oct. 30–Nov. 6.
Report of Committee on Private Fire Protection Service. (Am. Water Works Assoc.) (59) Nov.
The Chloramine Process as Applied to the Catskill (Esopus) Water.* Frank E. Hale. (59) Nov.
The Effect of the War Period 1914-1918, and Public Control Upon the Water Works of the United States.* Leonard Metcalf. (59) Nov.
Water Works Improvements and Fire Insurance Rates. Kelsey L. Walling. (59) Nov.

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* Illustrated.

Water Supply—(Continued).

Future Public Water Supplies in Iowa. Lafayette Higgins. (59) Nov.
Schoharie Development of the Catskill Water Supply System for New York City.* J. Waldo Smith. (59) Nov.
Field Methods for the Chlorination of Small Amounts of Water.* F. R. Georgia. (59) Nov.
Water Supply and Sewage Disposal at the Military Aviation Fields, Posts, Depots, etc., in the United States.* Robert H. Craig. (59) Nov.
Keeping the First Army Supplied with Water.* F. W. Scheidenhelm. (59) Nov.
Concrete in Water Works Construction.* A. C. Irwin. (60) Nov.
A Diagram Adaptation of the Rational Method of Storm-Water Drain Design.* Harold G. McGee. (13) Nov. 13-20.
Upkeep Problems at St. Louis Filtration Plant. August Nolte. (From Annual Report.) (13) Nov. 27–Dec. 4.
Duty of Water Investigations in Alberta.* F. H. Peters. (5) Dec.
The Queenston-Chippewa Hydro-Electric Power Project.* Harry Gardner. (117) Dec. 1.
Painting the Interior of Standpipes. A. H. Keen. (117) Dec. 1.
Construction Progress on Canadian Niagara Power Project.* (13) Dec. 11-18.
Jackson Lake Dam the Savior of the Snake River Valley.* (13) Dec. 11-18.
Water-Works Operating Problems at Quincy, Illinois. W. R. Gelston. (13) Dec. 11-18.
Tests of Concrete in Tension.* (For Concrete Pipe.) T. H. Carver and J. H. Quense. (13) Dec. 11-18.
Hydraulic Fill Dams of the Miami Conservancy District.* Harry Gardner. (117) Dec. 15.
New Hydroelectric Power Plant at Rio Pangal, Chile.* Hugh L. Cooper. (117) Dec. 15.
Wildschutz an offenen Werkkanälen.* G. Schendell. (40) Apr. 4, 1917.
Die neuzeitliche Zunahme der natürlichen Härte des Weserwassers. H. Keller. (40) June 16, 1917.
Vorschriften für die Lieferung von schmiedeeisernen und stählenren Rohren für Rohrleitungen nebst Zubehörteilen. (40) July 4, 1917.
Ueber die bei gleichförmiger Wasserabfluss wirkenden Kräfte und Energien. Fr. Engesser. (40) Aug. 11, 1917.
Ueber Sohlenwasserdruck bei Staumauern mit entwässerter Gründungsfiache.* Link. (49) Pt. 7.
Verwendung von Filterbecken (Anreicherungsgräben) zur künstlichen Grundwassererzeugung. H. Keller. (40) Serial beginning May 31.
Der Ausbau der bayerischen Wasserkräft.* Mattern. (40) June 7.
Ueber den Betrib der Bewässerung der Koniaebene. Gerhardt. (40) July 5.
Zur Grössenbemessung von städtischen Wasserwerken. Geissler. (40) Aug. 23.
Wasserkräfte auf Island.* (40) Aug. 27.
Die Reservekraftanlage des Elektrizitätswerkes der Stadt Lugano.* Val. Sacchi. (107) Nov. 1.

Waterways.

Manufacture and Testing of Large Chains for the Fenders in the Panama Canal Locks.* Henry Goldmark. (4) Feb.
Ironing Out a River Bottom.* J. F. Springer. (46) Oct. 18.
Lowering a 400-Ton Dock Caisson Gate with Sand Jacks.* G. W. Plaisted. (13) Nov. 13–20.
Small River Terminal for Widely Varying Water Stages.* Hunley Abbott. (13) Dec. 13–18.
Floodgates Proposed for Control of Savannah River.* E. C. Garvin. (13) Nov. 13–20.
The New Welland Canal.* (46) Nov. 15.
Concrete Shipping Pier at Panama Has Novel Design.* G. W. True. (13) Nov. 27–Dec. 4.
Bewegungsvorrichtungen für die Klapptore und die Zylinderschütze an den Schleusen im Osnabrücker Zweigkanal.* A. Franke. (40) May 10, 1916.
Neuere Uferbefestigungen in Beton und Eisenbeton und ihre Herstellungskosten.* J. Polivka. (78) Serial beginning Nov. 3, 1916.
Der Masurische Kanal; geologische Verhältnisse, Kanalquerschnitt, Ausführung der Erdarbeiten.* Ziegler. (40) May 19, 1917.
Windeinwirkung auf fliessende Gewässer.* Winkel. (40) May 26, 1917.
Eis- und Wasserstandverhältnisse der norddeutschen Ströme im Winter und Frühjahr, 1917. Uber. (40) Serial beginning June 23, 1917.
Der Abschluss der Nogat.* Salfeld. (49) Pt. 7.
Die Beobachtungen am Pegel von Kolberg in den 100 Abflussjahren von 1817 bis 1916. Musset. (49) Pt. 7.
Hebung eines gesunkenen Baggers in Kowno.* Piper. (40) May 7.

* Illustrated.

Waterways—(Continued).

Die Bewegung der Schwemmstoffe in unseren Flüssen. H. Krey. (40) Serial beginning May 10.

Standsicherheitsfragen beim Bau von Schiffsschleusen für hohe Gefälle.* Mattern. (40) June 18.

Ueber den Bau von Sandbuhnen.* B. Fechner. (40) July 23.

Ueber den Einfluss des Wasserauftriebs auf die Standfestigkeit der Bauwerke. Friedrich Engesser. (40) Serial beginning Sept. 3.

Einfluss der Abschliessung der Zuidersee auf die Sturmflutstände in Friesland und Groningen.* A. v. Horn. (40) Sept. 6.

Ueber Rutschungs-Erscheinungen bei Stauseen.* G. Lüscher. (107) Oct. 11.

Studien über Wasserbewegung an Wehren.* H. E. Gruner. (107) Serial beginning Nov. 15.

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